THE IRON TRADE REVIEW

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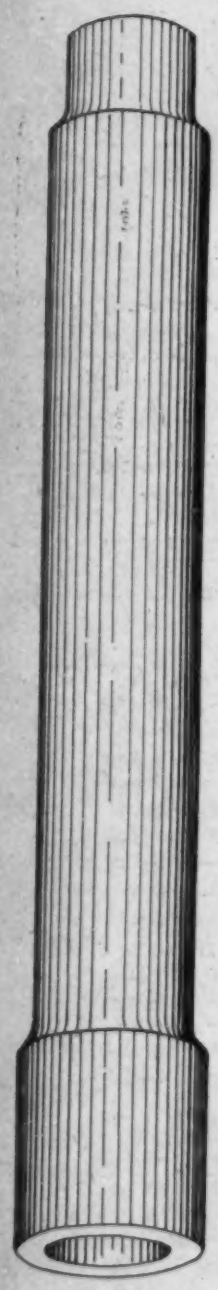

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. OCTOBER 26, 1899. CHICAGO, ILL. NUMBER 43

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Heavy sales of steel rails have been made in the week, in tonnage and at a price going far to establish the present level of values through the coming year. Following the announcement that an advance from $33 to $35 would be made on standard sections, effective Oct. 21, large deals were closed at $33. It is estimated that upwards of 1,200,000 tons have been booked first and last for delivery in 1900, and there is authority for an estimate close to 1,500,000 tons, exclusive of rails carried over, that cannot be rolled this year. These sales and the advance to $35 at a time when comment was thickening to the effect that the danger line in all prices had been certainly passed, have steadied the market on the present basis and given a strong guarantee of the preservation of substantially to-day's prices far into 1900. The belief that seemed to obtain in some quarters that all prices ought to be and would be lower for the first half has been revised to read "ought to be, but will not." The largest reported sale of rails is 110,000 tons to the Pennsylvania Railroad, the order being divided up as is usual with this road's tonnage. The week has brought also considerable purchases of Bessemer pig iron, the greater portion of the total of nearly 100,000 tons being taken by the leading billet producer of the Central West. The price fixed by the associated valley furnaces on a lot of 60,000 tons was $23 at furnace, but some sales were made at higher prices, reaching $23.50 on one lot. Estimated merchant Bessemer production for the first half of 1900 is now sold closer to the limit than has been known, so far in advance, and it is a question if there will be iron sufficient for the needs of steel works. Another prominent factor in calculations for next year, namely the price of coke, has had some attention in the past week. Negotiations by furnace companies have been on and when these are concluded it is believed a large proportion of the Connellsville coke production for next year will be taken up. A price of $3 for furnace coke has been regarded probable for next year, but it is believed the contract figure has been established on a more conservative basis. Demand for coke is on a scale that makes present producing capacity inadequate and new ovens will be needed before they can be brought into line. Some considerable transactions in steel billets are reported for the week. A consumer in the Pittsburg district has been in the market, likewise the leading consumer in the West and Central West. Sales have been made at $37 and $38, and sheet bars have sold at $36 and $37. Finished material apart from rails has been a waiting market, but the assurance that the leading steel mills will be well employed for the year and the willingness of so many railroads to pay the $33 price for rails, have led to a revision of some buyers' ideas, and a period of new activity in mill products for the first half of the new year is looked for. Foundry pig iron is very strong, but no large buying is reported for the past week. The majority of consumers have provided for a portion of their wants for the first six months of next year, and most furnaces are well sold to July 1. It is expected now that the basis for Lake Superior ores for 1900 will be determined early in November.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
705 PUBLICATION BUILDING, Oct. 25.

The market is in an anomalous condition. In raw materials there is, if anything, greater strength than a week ago, and large purchasers have taken hold for next year in a way which shows that they have the utmost confidence in the continuance of the present demands and prices. In raw materials sales for next year have been at higher prices than the general average of material sold for delivery during the closing months of this year. As against this finished products have been sold by a number of concerns at prices below the average which shipments in the latter part of this year will bring. A number of manufacturers in these lines prefer to remain out of the market and profess confidence that their time will come later and they will be able to get their full prices for the whole of their product. In plates, bars and sheets prices for delivery during the first quarter and half of next year are considerably below the prices which have to be paid for delivery prior to Jan. 1 next.

It is held by those in best position to judge that a great deal of work has been deferred on account of the high prices, those contemplating the outlay holding that present prices were only of a temporary nature, and would be quickly followed by a slump which would bring about prices very conducive to the investment of capital, but that when assurance is given the holders of this capital will grow tired of waiting and will regard in a much more favorable light the investment of money at about the present level. The developments of the past week have given much of the assurance needed that prices are not likely for some time to vary much from the present level and the deferred work about which there has been so much talk of late is likely to be taken up before next year has advanced very far, and this in addition to the demand which keeps up under all conditions, will keep capacity very well employed next year.

A very large rail tonnage has already been booked for 1900 some trustworthy estimates placing the quantity at 1,500,000 tons. During the past week over 100,000 tons of Bessemer iron has changed hands, and prior to that a very large tonnage had been placed, almost taking up the open capacity of the merchant Bessemer furnaces, to the middle of next year, the great bulk of the tonnage being sold at from $23 to $23.50, valley. It is believed that about all the rail tonnage was taken at $33. These sales taken together prove beyond any reasonable question that the high level of prices will be continued. With at least a small tonnage of rails booked for this year to be held over and further sales which may be made, the rail tonnage will again take a very large percentage of the steel production of next year, which is not likely to greatly exceed that of this year. And with steel manufacturers buying Bessemer iron so liberally at top prices, their entire confidence in the market is manifested.

PIG IRON.—The week in Bessemer iron has been an active one. On an inquiry from the National Steel Co., the associated valley furnaces fixed prices on pig iron which resulted in sales to this interest on Friday and Saturday of last week of 100,000 tons for delivery during the first half of next year, more in the first quarter than in the second. The price was on a scale of from $23 to $23.50, the preponderance being to-

ward the lower rate. The wire interest has been in the market for a large tonnage, of which the greater part is likely to be closed this week, at a price averaging slightly higher than on the sale already mentioned, as a greater portion is for the first quarter of the year. There have been sales of small lots and altogether the tonnage will aggregate an important one, and serves to show conclusively that the large concerns have the utmost confidence in the permanence of present conditions well through the first half of the year at least. The unsold Bessemer capacity for the first half of next year is being rapidly taken up and there is not a great deal remaining. It is probable that it will not be sufficient to meet the demands of steel mills. For the balance of this year there is scarcley any iron to be had and as high as $24.50 has been paid for quick delivery, in small lots. It is regarded as very probable that the freight rate on pig iron from the valleys to Pittsburg will be advanced Jan. 1 from 75 cents to 90 cents. In foundry iron there have been some sales, but the demand for prompt iron is not very urgent, as the strike among Pittsburg foundries for such a length of time has allowed some iron to accumulate. The furnaces have sold a very large tonnage for next year, and it would take them until not far from July 1 to complete the orders already booked. Prices in consequence have been advancing and No. 2 foundry cannot now be had under $23.25, Pittsburg, while higher prices have been paid for quick delivery. In forge iron the strength continues unabated and nothing below figures last quoted could be done. We quote the market as follows, prices on Bessemer and foundry iron for quick shipment being higher than the figures given:

Bessemer, valley furnace	$23.25	to	23.50
Bessemer, Pittsburg	24 00	to	24.25
No. 1 Foundry	24.00	to	24.50
No. 2 Foundry	23.25	to	23.50
No. 3 Foundry	22.50	to	23.00
Gray Forge, valley furnace	21.00	to	21.25
Gray Forge, Pittsburg	21.00	to	21 50

STEEL.—There has been a considerable quantity of steel sold during the past fortnight or so, a good part being ostensibly for delivery this year, from Ohio mills, but it is not likely that the deliveries will come near being made this year. The greater part of the steel sold has not passed into the open market, the sales being exchanges or acccompanied by deals which took them out of the sphere of regular market transactions. A considerable tonnage has changed hands at from $36 to $37 and considerably higher than this has been asked, in one case a quotation as high as $42 having been made on a lot of 50,000 tons of billets for delivery in the first and second quarters of next year. The leading consumer of billets is in the market for a considerable tonnage. With the large tonnage of rails already booked, conditions in the billet market are likely to be very firm, and prices seem more likely to advance than recede. There have been heavy sales of sheet bars for next year's delivery, at from $36 to $37, and the price is now fully as high as that of billets, instead of being lower, as for some time past. It is likely that before long sheet bars will regain their usual position at from one to two dollars a ton above billets.

FERRO-MANGANESE.—This line keeps up very strong, the minimum price for large lots being maintained at $100, while for smaller lots as high as $125 is being paid.

RAILS AND TRACK MATERIAL.—At a protracted meeting in New York lasting over part of last week and part of this, the rail manufacturers adopted a schedule which is to be strictly adhered to, as follows: Standard sections, over 200 tons, $35; 100 to 200 tons, $37; car lots, $38; less than car lots, $40; light rails, 25 pound, and less than 50 pound, $37, all f. o. b. mill, Pittsburg. These prices are to cover business booked for shipment during 1900, until further notice. Heavy sales of rails were made up to the time of establishing the new price and it is believed the amount placed with the rail mills will be 1,500,000 tons. There has been no change in track material. The demand continues good, at prices formerly quoted, as follows: Spikes, 2.60c to 2.75c; track bolts, square heads, 3.10c; hexagon heads, 3.25c; splice bars, 2.50c to 2.60c; links and pins, 2.70c to 2.75c.

BARS.—The scramble for tonnage of steel bars for next year's delivery among a number of the bar manufacturers has continued, and still lower prices have been made. A large tonnage has been placed for delivery next year at 2.20c to 2.25c. These prices are considered entirely too low by some manufacturers, who are holding off entirely by quoting in the neighborhood of 2.50c. For delivery this year nothing below 2.50c can be done, except perhaps in one or two sizes, while for nearby shipment higher prices are named, and as high as 2.75c has been paid. In iron bars the situation is quite strong. We quote iron bars from all muck stock, for shipment within 60 days at 2.50c. In the valley common iron bars are held at 2.25c for the same delivery.

STRUCTURAL MATERIAL.—The market continues very firm, but the rumor that an advance is contemplated cannot be confirmed. For prompt shipment there is a great scarcity of nearly all shapes, and heavy premiums have been paid for certain shapes. The outlook is very good, especially for structural material for various industrial enterprises. We quote the regular prices as follows, deliveries at such figures being obtainable beginning some time ahead: Beams, and channels, 3 to 15 inches, 2.25c; 18 to 24 inches, 2.35c; tees 2.30c; zees, 2.25c; angles, 2.25c. Universal mill plates are quoted at 2.75c to 2.90c.

PLATES.—There is quite a flurry in the plate market, owing to the anxiety of some mills to fill up for some time ahead, and there is a very wide range in quotations for delivery beyond Jan. 1. Some mills are quoting no lower than 2.90c, while others have gone after tonnage and booked heavy orders at prices ranging from 2.50c to 2.60c for tank plate. The outlook for a continued large demand is very good, and the mills which are not quoting anything like as low as these figures feel well satisfied that they will be able to get all the tonnage they want at higher prices, when their time comes, and as they are very well filled up for some months to come, they are not disturbed by the present state of the market. For prompt shipment plates are much higher, although spot shipmenst do not command the very high prices that were paid a few weeks ago. The recent advances in freight rates, and others to follow, have placed manufacturers at an unexpected disadvantage, as prices are named delivered from New York to St. Louis. Thus for some time past the rate to St. Louis has been a straight 18c, as against the rate formerly made of 12c, while to Chicago the rate has been 15c as against 10c. From November 1 the new classification, by which plates are changed from the fifth and sixth classes to the fourth and fifth, will advance the rates to St. Louis and Chicago to 22c and 18c, respectively. For delivery within 30 to 60 days tank plate can be had at from 2.90c to 3c. For later deliveries we quote the market as follows: Tank, 2.50c to 2.60c; shell, 2.60c to 2.70c; flange, 2.70c to 2.80c; fire box, 3¼c to 4c.

PIPES AND TUBES.—The demand for pipes and tubes is well maintained and although at this time of the year there is usually a decided slackening, the new orders are almost at as heavy a rate as the production. There has been some pipe stored, intended for shipment to Southern Africa, on account of the uncertainties caused by the war, while the manufacture of other pipe for this district is being delayed. The cessation in shipments is expected to be of only a temporary nature, as the British re-inforcements now on the way to the scene of the war will be able to settle matters and permit of operations being continued. For some time past there have been heavy exports of American pipe to this region. Prices remain unchanged as follows: Merchant pipe, 50 and two 10's for carloads and 50, 10 and 5 for less than carloads, carloads being delivered within the specified territory and less than carloads being f. o. b. mill; well casing, screw and socket joint, 40; inserted joint, 35, with an optional 5 per cent to dealers only; boiler tubes 1¼-inch to 1½-inch, 40 per cent off; 1¾-inch to 2½-inch, 50 per cent off for iron, and 55 per cent off for steel; 2¾-inch and larger, 52½ per cent off for iron and 55 per cent off for steel, with 5 per cent additional in carloads, less than carloads being f. o. b. mill.

SHEETS.—The proposed consolidation of sheet mills is still hanging fire and nothing certain can be predicted as to the final outcome. It is now learned that despite the stringency of the money market the necessary cash was provided some time ago and is awaiting the completion of the other arrangements. The deal may be concluded before the options expire on the first day of next month, and in case this is not done, it is expected that the options will be renewed for

another six months. It is understood that arrangements can be made for doing this, although the options were taken at figures which are regarded as very low. The sheet market has weakened further since last report and mills are quoting as low 3.10c on No. 28 gauge for desirable orders. Sales have been made during the week at from 3.10c to 3.20c. While the mills still have considerable tonnage on their books, they are not as well filled up as they were a month or two ago. A number have bought bars rather heavily for next year. In galvanized the situation is about as last reported, and there would be no difficulty in doing 70 and 10 per cent off, with a 15-cent freight allowance.

SPELTER.—The spelter market has refused to respond to the influence of the ore mines shutting down. The miners are now talking about building an independent smelting plant. We quote the market unchanged at 5.40c to 5.45c, Pittsburg, for prime Western grades.

OLD MATERIAL.—Prices are rather irregular, but are in general higher. The mills are pretty well filled up with scrap while dealers are looking for more material. Efforts are being made by an Eastern firm to form a consolidation of scrap iron dealers, but the benefits of the proposed scheme are not apparent. We quote prices from $1 to $2 a ton higher, except in the case of old iron rails, which are very scarce and are therefore help at a very high price, which the entrance into the market of a very moderate tonnage would no doubt break: Pittsburg, gross tons, except where otherwise specified: Steel rails, mixed lengths, $20 to $21; short lengths, $21 to $22; iron rails, $30 to $33; cast borings, $12 to $13, net tons; cast scrap, $18 to $19; No. 1 wrought scrap, $21 to $22, net tons; busheling scrap, $16 to $17, net tons.

COKE.—The coke market continues very firm. There has been some selling at from $2.75 to $3, but the regular price has not been openly made as yet, though sales have been made to a number of consumers in the blast furnace trade, for next year's delivery. The car supply is still very poor and it is difficult to keep the furnaces running. Production has been considerably curtailed, but there are still considerable quantities of coke piled at the ovens.

CHICAGO.

Office of The Iron Trade Review and Industrial World.
1522 MONADNOCK BLOCK, Oct. 25.

The event of the week was the large sales of rails closed, followed by an advance in the price to $35 and $37. While no definte information is to be had regarding the rail tonnage sold in the week, it is undoubtedly very large, running up to several hundred thousand tons. The fact that the railroads have made these purchases, and are also in the market for large numbers of cars, is one of the strongest arguments in favor of a continuance of the present prices, and possibly higher ones, during next year. The mills represented here all seem to be of the opinion that the demand for iron and steel will continue throughout next year, and that mills and furnaces will have no difficulty in selling all the material they can make, and at prices fully as high as prevail at present. With the exception of the advance in rails, and an advance of $3 a ton on wire and wire nails, prices have not been changed in the week.

PIG IRON.—The week's sales were hardly as heavy as those of the week previous, but were of fair size, and included several quite large orders. The demand is good, and comes from numerous sources; it is not confined to a few buyers. Furnaces welcome the slightest let-up in the demand, as it gives them a chance to catch up on their orders. Foundries in this district continue to run full time and Sundays, and are using all the iron the furnaces can get to them, and undoubtedly would use more if it could be had. There have been no changes in prices, but the market is exceedingly firm, and furnaces are always able to secure full quotations on whatever they may have to sell. We quote as follows:

Lake Sup. Charcoal....	$24 00 @$26 00	Southern Coke No. 3....	$20 65 @$21 65
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Local Coke Fdy. No. 2	23 00 @ 23 50	Southern No. 2 Soft.....	21 65 @ 22 65
Local Coke Fdy. No. 3	22 50 @ 23 00	Southern Silveries.....	26 50 @ 27 05
Local Scotch Fdy. No.1	23 50 @ 24 00	Jackson Co. Silveries..	24 00 @ 25 00
LocalScotch Fdy. No.2	23 00 @ 23 50	Ohio Strong Softeners	31 00 @ 32 00
Local Scotch Fdy. No.3	22 50 @ 23 00	Alabama Car Wheel...	25 00 @ 26 00
Southern Coke No.1...	22 65 @ 23 65	Malleable Bessemer ...	23 50 @ 25 00
Southern Coke No.2...	21 65 @ 22 65	Coke Bessemer.....	24 00 @ 25 00

BARS—The demand for bar iron and steel continues, and good sales were made in the week, including three or four large orders for delivery during the first half of next year. Mills are firm in their views, and are not making lower quotations than have been ruling during the past several weeks, reports to the contrary notwithstanding. Common iron is quoted at 2.35c to 2.50c, and soft steel, 2.35c to 2.65c Chicago, half extras.

CAR MATERIAL.—One trunk line is reported to have made an effort to secure the entire capacity of a large car works for the next six months, amounting to about 15,000 cars, but was unsuccessful, as the works already has its output nearly taken for that period. Whether the road will be successful in placing the order elsewhere is still undecided. An order for 1,500 cars was placed in the week with the Pullman company by the B. & O. road, and other business was large. The shortage of cars has been so pronounced in the past two weeks, that nearly all of the large roads have been figuring on increasing their rolling stock, and orders are likely to be plentiful as a consequence.

STRUCTURAL MATERIAL.—Considerable business is done every week in comparatively small lots, but nothing large has been closed or is in sight for the near future. The mills are well sold ahead, and the largest manufacturer of structural shapes reports its mill sold so far ahead for next year that it expects not the slightest trouble in maintaining prices throughout the year. Quotations are unchanged as follows: Beams, 15 inches and under, 2.40c; 18 inches and over, 2.50c; angles under three inches and over six inches, 2.50c; three inches to six inches, 2.40c; sheared plates, 3.15c to 3.25c; universal plates, 3.15c to 3.25 tees, 2.45c; zees, 2.40c; small lots from store are quoted from ¼c to ½c higher.

PLATES.—There seems to be a large demand for mill shipment, but the local mills are unable to take much of the business, they are so well sold ahead. Store business has been excellent, and several good orders were taken last week. Prices are made as follows: Tank steel from store, 3.40c to 3.50c. Mill shipments, Chicago delivery: Tank steel, 3.15c; shell, 3.35c; flange, 3.40c; marine 3.40c; fire box, 4c to 6c, according to brand.

MERCHANT PIPE.—The demand continues large and sales from store were of considerable dimensions last week. Orders for mill shipment are difficult to place, as the mills are not looking for business. Prices are firm at 50 and 10 and 10 per cent off for mill shipment.

SHEETS.—Sales in the week were quite large, and the demand appears to be increasing somewhat. Several quite large orders were placed in this market during the week. No. 27 black sheets are unchanged at 3.30c to 3.40c, and galvanized at 70 and 10 to 70 and 5 per cent off.

MERCHANT STEEL.—The demand is hardly as large as it was a week ago, and sales last week were somewhat smaller than those of the week previous. The market is firm and unchanged: Smooth finish tire steel is quoted 2.80c to 3c; smooth finish machinery steel, 2.95c to 3.05c; spring steel, 3.65c to 3.75c; tool steel, 7c to 7.50c; special, 13.50c and upwards.

BILLETS AND RODS.—The local mills have made no sales, and there are no quotations obtainable in this market.

RAILS AND TRACK SUPPLIES.—The tonnage of rails placed last week was very large, running up into several hundred thousand tons. It is estimated that sales so far for delivery next year have aggregated over 1,000,000 tons, of which about one third was placed in this district. The large sales made last week were followed by an advance of $2 a ton on rails, making the present price $35, Chicago, for standard sections, and $36, minimum, on light sections. A considerable tonnage of track supplies was sold also, and there is more business to be placed soon. Quotations are as follows: Rails, standard sections $35 to $37; light sections, $36 to $42; splice bars, 2.50c to 2.70c; spikes, 2.65c to 2.75c; track bolts, 3.65c to 3.85c.

WIRE AND WIRE NAILS.—Makers advanced quotations $3 a ton on wire and wire nails early last week. Notwithstanding the higher prices, sales have been fully as large as they were previous to the advance, and as the demand is increasing all the time, it is expected orders will keep up. Makers quote single carloads of wire nails at $3.25 f. o. b. Chicago, and $3.35 less than carloads. On wire current quotations are as

follows: Plain annealed wire, $3.10; painted barb wire, $3.70; galvanized barb wire, $3.85.

OLD MATERIAL.—Consumers have been able to secure quantities of old material outside of the city, and have not been compelled in all cases to pay the prices asked by the dealers, who are still holding at the figures quoted last week. The dealers, however, have not very large stocks, and are of the opinion that they will have no difficulty in getting all they ask for what the have to sell. Their quotations are as follows:

Old iron rails, gross,	$35 00@$36 00	Axles, net	$31 00@$32 00
Old steel rails, long, gr.	24 00@ 25 00	Cast borings, net	10 50@11 50
Old steel rails, mixed	20 00@ 21 00	Wrought turnings, net	13 00@13 50
Old wheels, gross	21 00@ 22 00	Axle turnings, net	13 50@15 00
Railroad forge, net	25 00@ 26 00	Mixed steel, gross	16 00@17 00
Dealer's forge, net	19 00@ 21 00	Stove plates, net	11 50@12 00
No. 1 mill, net	16 00@ 17 00	Heavy melting steel, gr	19 00@20 00
Heavy cast, net	16 00@ 17 00	Old iron splice b., net.	27 00@28 00
Malleable cast, net	14 00@ 16 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World.* 8. 27 VINCENT ST., Oct. 25.

With the opening of navigation for 1900 six months off, the bulk of the ore that is to be shipped next season is covered by charters or provided for in boats owned by producers. In the past week further business was done at $1.25 from the head of the lake, $1.10 and $1.15 from Marquette and $1 from Escanaba. The Rockefeller interest is now credited with vessel capacity, either of its own or chartered, considerably in excess of 6,000,000 tons. Reports to the contrary notwithstanding, it seems settled that it will have not more than 1,000,000 tons of Carnegie-Oliver ore to haul, this coming from the Mountain Iron mine. Add to this 300,000 tons of Biwabic ore, which its vessels carry under contract, and the probable output of the Lake Superior Consolidated iron mines, and there is still left a tonnage of between 2,500,000 and 3,000,000, a portion of which is no doubt to be applied on the ore of a connected ore selling firm. The Carnegie-Oliver order for new vessels was increased from five to six with an option on a seventh, thus taking up well into next year all the berths of the American Ship Building Co., on which vessels of modern size can be accommodated. There has been purchased for the Carnegie fleet, in addition to the Clarence A. Black, mentioned last week, the steamer Linn and the barge Carrington. Other vessels are under option and further purchases may be announced later. It is stated that with the 1,000,000 tons the Rockefeller fleet will haul for it, the Carnegie interest has now quite fully provided for its tonnage needs for next year, or will have done so when pending deals are closed. The main contingency is as to the portion of next season for which the boats to be built will be available. As indicated last week, the passing of vessel property into the hands of ore producers has been going on very rapidly. The vessel company identified with the American Steel & Wire Co. bought in the past week the two vessels recently ordered by A. B. Wolvin. They will go into the Marquette-Cleveland ore trade, carrying something over 3,000 tons each. The same company bought also the steamer W. H. Gilbert. Its fleet is now capable of carrying over 2,000,000 tons of ore a year, or considerably more than the present capacity of American Mining Co. mines.

It is now expected that a meeting of ore men will be held in the next two weeks, and the closing of ore business will doubtless follow soon. Some diversity of view appears as to the price that should be asked. There are conservatives and there are those who favor a larger advance than has been seriously discussed thus far. It does not appear that any sales have been made beyond those recently reported, in which high phosphorus ores of the Crystal Falls district were quite fully sold at $4 a ton. These ores run from 58 to 60 per cent in iron and from 0.5 to 1 per cent in phosphorus.

PIG IRON.—The meeting of members of the Bessemer iron producers' association on Wednesday, Oct. 18, resulted in fixing a price of $23 valley furnace, on Bessemer iron for the first half of next year, and a sale of 60,000 tons to the National Steel Co. was made. Some further sales of association and outside iron are reported, and as high as $23.50, valley, is said to have been secured for delivery in the first quarter of 1900. The estimated production for the first three months is now thoroughly taken up and the furnaces have disposed of the bulk of their make for the second quarter. As usual in October there has been better working of furnaces, under decreased humidity of the atmosphere, and shipments on contract are somewhat improved. Foundry buying shows a lull. For this years delivery in small lots No. 2 has sold at $23 to $24; for next year from $2 to $23. Foundries are overrun with work and are taking contracts for deliveries of castings well into next year. The Lake Superior charcoal producers have sold their product for several months into 1900, some of them far into the year, and the demand is still unsatisfied. Forge iron is very firm at the prices quoted, and there are evidences that leading consumers will need more metal than can be supplied. We quote the Cleveland market:

Bessemer	$24 00	Valley Scotch No. 1	$23 00@23 50
No. 1 Strong Foundry	23 00@ 23 50	Valley Scotch No. 2	22 50@23 50
No. 2 Strong Foundry	22 50@ 23 00	Gray Forge, valley	21 00@21 50
No. 3 Foundry	21 50@ 22 00	Lake Superior Charcoal	25 00@26 00

FINISHED MATERIAL.—Rails have been the chief factor of moment in the local market the past week. The Lake Shore road is reported to have bought 10,000 tons, the Nickel Plate 5,000 tons, and the Toledo & Ohio Central, Wheeling & Lake Erie, and Pittsburg, Lake Erie & Western amounts making a total of about 30,000 tons. There has been some waiting by consumers of rolled material, who having bought for a part of their needs for the first half of next year are taking time to see how the market tends. Lower prices for next year than for the remaining two months of 1899 have been made in most lines, and there has been some uncertainty as to the stability of prices in bars, sheets and plates, since there was not the uniformity in quotations for next year noticeable on business for nearby delivery. The events of the week, particularly in the rail and mild steel markets, have made surer the maintenance of the present level. We quote iron bars at 2.15c, half extras, valley mill, with charges for cutting and assorted sizes. The same quotation has been made in the Toledo district, where the same company has a mill, indicating that valley price plus freight is not the rule in territory served by local mills. The Cleveland price out of store is still 2.50c, full extras. In plates some inquiry is up, for further vessel building. Ship plates are quoted 2.90c, Cleveland. Some mills have quoted as low as 2.60c to 2.70c, Pittsburg, for tank steel for delivery next year, but others are still very firm at 2.80c to 2.90c. Sheets are still the weakest branch of the market and from mill deliveries can be made in two weeks on black and galvanized. We quote 3.10c to 3.15c, Pittsburg, for No. 28. Structural material is very stong and mills are well filled up for this year, with a large tonnage also booked for 1900.

CINCINNATI

Oct. 24.

Basic and charcoal iron have led in local pig iron selling the past week. Rogers, Brown & Co. report that it has been found almost impossible to secure basic of regular specifications and efforts have been made to obtain irons not generally used for that purpose. "One consumer bought 28,000 tons. Several sales of charcoal iron were made at full prices, for deliveries extending through first six or eight months of next year. It is reported that the output of Southern furnaces making car wheel iron is now sold up until July 1st, and it is not known from what source further supplies can be drawn for customers who have not yet covered their requirements. The situation seems about the same in the Lake Superior charcoal district, one of the important producers being out of the market on account of over-sold condition. Nearly all special brands such as Jackson County high silicons, Lake Superior coke and malleable irons are not obtainable now for early delivery. In Southern brands the situation continues the same that it has been for the past few weeks. Several sizable lots have been sold of No. 1 foundry, at $19, and No. 2 foundry, $18, cash Birmingham. There are some large deals on for No. 4 foundry and gray forge. The furnaces generally are heavily sold ahead on these grades, and are not in position to guarantee the deliveries required. The rank and file of buyers are in a waiting mood, but some of the largest consumers are quietly testing the market and buying anything that seems inviting."

Matthew Addy Co. comment as follows: "One great feature of the situation just now is the absolute scarcity of cars in which to ship pig iron. Furnaces North and South alike have the same complaint to make, although the situation south of the Ohio river is much worse in this respect than

North of it. The week was brisker than the week immediately preceding it. There was a good deal more activity in the market and much more general inquiry. A great deal of iron has been asked for that could not be supplied. All such inquiries only go to show the strength of the situation. Several of the very large concerns who have thus far persistently kept out of the market have been feeling it of late and have been soliciting offers on round lots for long forward shipment. The situation certainly gets better from the iron seller's point of view the farther along we go."

THE MOLDERS' STRIKE AT PITTSBURG.

(Special Telegram.)

PITTSBURG, Oct. 25.—The molders' strike in the Pittsburg district is still on but it shows signs today of an early termination. In one or two instances the men have been resorting to violence. Last week an attempt was made to call out apprentices, but it failed except in one shop. Several foundries are now running, with slight advances in wages. The molders demands have not been granted, however, in any case and the victory, if there is any, is fully as great for employees as for men. Before the strike a joint committee of foundrymen and molders agreed to resolutions calling for arbitration, the men meanwhile to continue at work and the employers guaranteeing to have the matter settled within two weeks from Oct. 2. Any advance made was to begin with that date. A mass meeting of molders refused, however, to accept the resolutions and treated their own committee very roughly. Martin Fox, presidnt of the Iron Molders Union of North America, ordered the men back to work; but all of them are not members of the national organization, and they refused to obey the order.

LAKE SUPERIOR IRON MINES.

The Oliver Iron Mining Co. has an option on what is known as the "Sheridan homestead" property in 5-62-14, about seven miles north of Tower on the Vermillion range. A five-mile branch must be built from the Duluth & Iron Range road to reach the mine, unless it is the purpose ultimately to have the proposed Carnegie railroad go to this mine. The minimum output called for in the lease is 100,000 tons, and hte royalty 25 cents. The Oliver Iron Mining Co. also has under option an important property on the Mesabi range.

The stock of the Republic Iron Co. sent in by the stockholders to a committee of the directors, for sale under options at $30 a share, in accordance with a circular of some weeks ago, has been returned to the owners, no sale having been made. The time named in the option expired Oct. 20. The circular from President W. D. Rees, accompanying the stock returned, simply stated that no sale had been made, and contained no request for an option at a lower price.

The Spruce Mining Co., formed by P. L. Kimberley and associates to open the Eveleth townsite, is beginning work. Capt. Cowing, late of the Savoy mine, will be captian, and the mine will be worked underground by the square set system. Wallace Kimberley, will be in charge. A shaft has started and considerable ore will be stocked this winter. There are 75 feet of surface over the ore, and the mine is wet, but its ore is practically all Bessemer of good condition physically. There are known to be some 7,000,000 tons in the deposit, which belongs in fee to the owners of the Adams and parts of the Fayal.

Joseph Sellwood, general superintendent of the American Mining Co., the American Steel & Wire Co.'s mining connection, has acquired the Rolling Mill mine from Capt. Samuel Mitchell, of Negaunee. There is a large open pit on the property from which considerable ore was taken years ago. Mr. Sellwood has also secured recently the Hill Top mine at Crystal Falls. The ore is silicious.

Corrigan, McKinney & Co., who have had the Crystal Falls, Lincoln, Lamont and Great Western mines in the Crystal Falls district, are taking more ground in the same district for examination. Negotiations are on for the acquisition of the Hope mine.

The Mahoning Ore & Steel Co. has secured a property in section 15, 65, 14, between Tower and the new Oliver option on the Vermillion range. It will be explored the coming winter and may become a small shipper next year.

PERSONAL.

Albert Ladd Colby, has resumed his duties as metallurgical engineer of the Bethlehem Steel Co., after over a year's absence in the Adriondack woods, which entirely restored his health.

P. W. Gates, president of the Gates Iron Works, Chicago, has returned from a six months' trip abroad, in which he visited most of the countries of northern and central Europe on business and pleasure.

C. L. Miller, at present general superintendent of the Pittsburg district, will assume the duties of general superintendent of the American Steel & Wire Co., on Nov. 1, having in charge the operation of all plants.

Joseph Sellwood has been appointed general superintendent of the American Mining Co., an allied company of the American Steel & Wire Co., for the operation of Lake Superior iron mines. The appointment became effective Oct. 23.

Henry James Kimman, mechanical superintendent of the Standard Pneumatic Tool Co., Chicago, has sailed for England to superintend the installation of machinery in the works of the International Pneumatic Tool Co., Chippenham, Wilts. This company recently purchased the right to manufacture and sell the "Little Giant" pneumatic tools and appliances in the British Empire. After concluding his work in that country, England, Mr. Kimman intends to make a tour of inspection and instruction among his company's agencies in Paris, Brussels, Berlin, Dusseldorf, Vienna and Amsterdam. He will be absent about three months.

Alson A. Button, recently apponted superintendent of the Crescent plant of the American Tin Plate Co., at Cleveland, is also president of Crescent lodge of the Amalgamated Association.

F. A. Bates, who negotiated the acquisition of iron ore properties in Cuba, west of Santiago, for New York and Philadelphia capitalists, goes to Cuba shortly in the interest of the Cuban Steel Ore Co., which is to develop the properties. The work of building a dock and railroad is under contract.

Chauncey B. Gross has been made manager of the recently organized Gross Foundry & Machine Co., at Hillsboro, O.

President W. L. Brown, of the American Shipbuilding Co., returned last week from a two months' stay in Europe, most of the time being spent in England and Scotland. Mr. Brown says: "Necessarily my field of observation while in Great Britain was limited, hence to a certain extent superficial; but in all my conversations my English acquaintances and friends readily admitted the patent fact that, in the very nature of the new conditions we have created and were creating, we would largley increase our mercantile and naval marine. I returned even more strongly impressed than ever before that we can and will be able to command practically the markets of the world with our iron and steel products. I was also convinced that with the world's demand there is certainly a growing scarcity of raw material, both in Great Britain and at the better known points on the continent. In Great Britain I found every iron and steel industry, as well as shipbuilding, very active, quite as much so as at home, and necessarily to a large degree this extends to the continent, although I did not see so much of this on the continent as in Great Britan."

G. G. Thorp, assistant superintendent, is expected to succeed Theodore Robinson as superintendent of the Joliet works of the Federal Steel Co., when Mr. Robinson becomes general superintendent of the four Western plants of the company.

J. K. Dimmick has resigned as Southern manager of the United States Cast Iron Pipe & Foundry Co., and is succeeded by J. W. Holmes, of Paducah, Ky.

Wm. Summers, formerly of the Struthers, O., rolling mill, and latterly connected with the Piqua (O.) Rolling Mill Co., has accepted the superintendency of the Dennison Rolling Mill Co., Dennison, O.

AMERICAN Pig Iron Storage Warrant stocks have got below the 20,000 ton mark. In the 10 days ending Oct. 20 there had been put in the yard 500 tons and withdrawn 1,600 tons, leaving net stock in yard Oct. 20, 19,200 tons.

THE IRON TRADE REVIEW

AND

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HIGH COSTS AND THE REACTION.

At this juncture, when the question of the duration of the high level iron and steel prices have attained is foremost with every manufacturer or considerable consumer of iron, the stronger interests appear to be throwing their influence on the side of high prices.. A large vessel and ore interest, for example, decided by its action two weeks ago that lake freights should be on a basis 25 per cent higher than would have been possible without the special exertion of its influence. The steel rail manufacturers have fixed a price on the bulk of the sales made for 1900 that indicates their faith in the continuance of substantially the present rate of consumption of iron and steel through another year. Evidently the disparity between the $31 price of rails and the prevailing price of the relatively small amount of steel that under the consolidation regime is disposed of in the form of billets in the open market, was more influential in fixing the $33 basis than the protests of certain railroad officials who declared that they could not justify to their directors the purchase of any considerable amounts at the highest price in several years and presumably the highest price for some years to come. Yet sales of large lots have been made at $33, bringing the bookings for 1900 up to more than 1,000,000 tons, and the price has now been advanced $2.

On the buying side of the market it has been noticeable that with few exceptions the concerns that have made the largest and the farthest-reaching contracts for pig iron and finished material have been the largest and strongest. Strong foundry and engineering firms have taken hold vigorously and covered for a large output of goods which they must sell at marked advances over this year's prices. In the agricultural implement trade there have been some cautious buyers, who fear the curtailment of consumption when their farmer customers come face to face with next season's prices. Yet some notably large manufacturers have bought as liberally as usual, on the belief that business would be done next year in usual volume.

There is no doubt of the influence of such confidence shown by commanding interests. It will beget its kind. But there can not be ignored the effect of the general belief that a Presidential year is not conducive to expansion on a high basis of values. Nor can we lose sight of the persistent and very real sentiment that high prices are adding to output and holding back business, so that the time cannot be far distant when an equilibrium will be restored and then the output exceed demand.

We do not find indications in current events of any early or serious limitation of consumption of iron and steel. Phenomenal as the present rate is, it has back of it the strength of the splendid buying power of the largest and best paid body of wage-earners ever employed in the United States, and it is well to finish the first year of the revival in iron and steel and then wait a year before being exercised over fears that the pace of consumption can't hold out. The real matter of concern is the swift revolution that is going on in all the elements of cost in the manufacture of iron and steel. When the market reaction comes at length, it will not be gradual like the ascent. In 1880, following the boom, the price of No. 1 anthracite pig iron fell from $43, the high point reached in February, to $25, on May 15. Refined bar iron fell from $89 in February to $56 in May. But ore, coke, pig iron and finished material contracts could not be revised with the same facility. For some time past the iron trade has been undergoing radical changes in its cost basis. Labor has had advance after advance; and it need not be presumed that the end has been reached. The scale for finishing mills has been definitely fixed to the middle of next year. But iron mining wages are not at maximum, and there may be other advances which are not now figured on. Iron ore will advance sharply—more sharply if some interests have their way than has yet been generally calculated. Coke will advance to a figure not known in contracts for years. Rail freights have gone up, and the end has not been reached, from indications.

When all the increments of cost are gathered together, the basis on which the maker of pig iron will find himself will be simply revolutionary. Already it is estimated that the calculations of those who have started old and unfit plants, in the expectation of getting raw material at figures prevalent in the early part of the year and selling at the top of the market, have suffered some unpleasant revisions. The difficulty is that producers are tying themselves up to raw material contracts that run for a year, and that a new basis for labor has been established that cannot be altered even when the reaction comes, without the bitter struggles that are the most deplorable feature of periods of falling prices.

It must be admitted that in times like the present there is no great attention given to analyses of the situation, nor is much thought given to the remoter future. The experience of making large sales at high prices is too intoxicating to be interrupted by provision against troubles that are not in sight.

But trade history is read with little profit if it does not in some degree modify the policy of those who in laying the foundations of their present success are credited with the exercise of marvelous foresight.

LAKE SUPERIOR ORE PRICES FOR 1900.

Far earlier than in any recent year the question of iron ore prices for the coming season is up for consideration and the month of November is likely to bring very considerable sales. The attention of the iron trade has been centered upon the transportation factor in ore cost by the unusual events of the past two weeks. Sensational prominence has been given in the newspapers to the part taken by the Rockefeller ore and vessel interest in the establishment of a lake freight on ore 25 per cent higher than would have been made, had the lake freight situation been left to the operation of the usual forces. It has been rightly assumed that the 25-cent increment would be provided for in turn by the enhanced price of ore.

At first glance the problem before the ore producers may seem a simple one. Last winter they sold over 14,000,000 tons of ore at a fractional advance over the basis of 1898, and immediately after there burst upon the iron trade such an expensive demand as in a few months carried prices 100 per cent beyond the starting point. It seems simple enough to say that as the ore producer has not had a share in the marvelous prosperity that followed so quickly upon his undesigned generosity, it is now in place for him to name a figure for his product that will bring him in line with the general movement. But there are several factors to be considered.

First of these is the growing feeling that the high point in finished product has been reached. The ore producer comes to the establishment of a price for 1900 with production of pig iron and rolled material increasing and fear of a famine of material largely dispelled. His memory of the price fixed for 1896, following the ephemeral iron boom of 1895, does not encourage the establishment of a price involving the element of retroactive compensation. The scant sales of 1896 carry the suggestion that the ore price must be justified by future business, not by that of the past, though it be recent.

It is to be considered in the second place that the ore price soon to be fixed will apply to ore that will still be going into production in May and June 1901, or more than 18 months hence. Much has happened in the iron trade of the last nine months. Surprising developments may come in the next nine months and more surprising in the nine months following. It is true that considerable sales of pig iron and of a lesser tonnage of finished material have been made for the first half of 1900; but it is true also that only a small fraction of the ore that will be sold for delivery in 1900 will enter into the material thus sold. The ores bought this year will last for the most part to June 1, 1900; some few consumers are supplied to July 1. Thus the Lake Superior iron ore producers, in fixing prices for the ore year 1900–1901 are establishing a basis for material that is practically unsold. And herein lies the special difficulty of the situation. No one in the trade has any basis, in sales or in market tendencies, for assurance that the present level will last beyond the middle of next year. It may go beyond that point, but increasing production and a widespread conviction that prices are too high must have their effect.

Another factor in this year's ore situation is the larger proportion of the Lake Superior product in the hands of ore consumers. The buying of mines has been a busy industry the past year, and it is quite within bounds to say that between 12,000,000 and 13,000,000 tons of the ore mined in 1900 will come from the mines of consuming interests. Heretofore the producing-consuming companies that have been represented in the conferences of the old range Bessemer ore interests have taken a conservative view of the situation. The accession of the large consolidatios to the ore trade circle may bring another view of the relation of the price of ore to the general situation. It may be argued that a strong advance in the foundation product will be desirable to accentuate the advantageous position of steel makers who have grounded themselves in large ore reserves.

Some of the preliminary discussion of iron ore prices has brought out ideas that indicate a long postponement of reactionary values in finished lines. Such views are based on the general proposition that iron mining has long waited for a profitable year, and that the present opportunity must be seized as one not likely soon to be duplicated. It goes without saying that the trade expects the ore men to get a highly remunerative price for next year's output, but there is the same danger of making a mistake here that has been repeatedly spoken of in connection with prices of finished products. The difference is that in the case of ore it will be farther-reaching and less quickly repaired.

The Bridge Works Consolidation.

Pittsburg papers have reported in the past week the completion of the consolidation of bridge companies under the name of the American Bridge Co. The names of the 35 companies included, as heretofore given in these columns, are repeated and the capitalization is given as $67,500.000, of which $23,000,000 will be issued as preferred stock, $34,500,000 as common stock, and $4 000,000 preferred and $6,000,000 common is to be held in reserve. It is stated that Charles M. Jarvis, president of the Berlin Iron & Bridge Co., East Berlin, Conn., will be president, and Fred. Wyant, of the Wrought Iron Bridge Co., Canton, treasurer. Heretofore Percival Roberts has been slated for the presidency, though his acceptance has not been certain. The report adds that a meeting would be held in a few days to elect directors and officers and that the new company would be operative early in November.

The statement is made by the underwriters, J. & W. Seligman & Co., of New York, concerning the above that there has not been any recent change in the situation relative to this consolidation.

THE Pittsburg Coal Co., capitalized at $64,000,000, has been formally organized by the election of the following directors and officers: Directors.—Francis L. Robbins, Andrew W. Mellon, Henry W. Oliver, John D. Nicholson, Upson A. Andrews, James C. Dysart, Pittsburg; Frank M. Osborne, Dan R. Hanna, William P. Murray, Charles W. Baine, Peter M. Hitchcock, Cleveland; Matthew H. Taylor, Erie, Pa.; Edward N. Saunders, St. Paul, Minn.; Grant B. Schley, New York; Jacob E. Ridgeway, Philadelphia. Executive Committee.—Francis L. Robbins, Frank W. Osborne, Andrew W. Mellon, Matthew Y. Taylor, Dan R. Hanna, John D. Nicholson, William P. Murray. Officers.—Francis L. Robbins, chairman of board and executive committee; Frank M. Osborne, president; James C. Dysart, vice-president; Upson A. Adrews, treasurer; Charles W. Baine, secretary and auditor; George W. Schluederberg, general superintendent of mines; E. J. Taylor, chief engineer.

THE WEEK IN IRON AND STEEL STOCKS.

Denison, Prior & Co., in their weekly iron and steel letter say: "The iron and steel stocks with other industrials, have been under considerable pressure during the past week, owing to the decision which was rendered in Illinois Supreme Court against the Glucose Sugar Refining Co. It is now said that similar suits will be brought against the National Biscuit Co. and National Steel Co. Of course, these suits will be the cause of considerable liquidation in the stock effected. In the case of the Glucose company, there was a sharp decline of from 15 to 20 points on the publication of the decision of the Supreme Court. This legal fight is something which the promoters of industrials have anticipated, and undoubtedly the condition will bring about its own solution. This condition is the one thing that now stands in the way of higher prices for these stocks. The earnings of the various iron and steel companies continue on a tremendous scale and there is no question but that all of them can pay dividends not only upon the preferred issues but upon common stocks as well. It is unfortunate that these various complications should occur to the injury of the legitimate corporation; but it is a condition that must be met and which will undoubtedly be successfully overcome. Investors can safely buy these preferred stocks on any declines. The common stocks will be the greater sufferers, and as they do not enter into the investment field they had far better be left to the speculator than traded in by any but an insider."

Fluctuations of the Week and the Year.

The following table shows the fluctuations in iron and steel stocks in the week ending with Monday, Oct. 23, and in the present year:

Name.	WEEK.				YEAR.			
	Open	High	Low	Close	High.		Low.	
Am. Car & Fdy.....	15¼	16⅛	15	16⅛	21⅜	May 25	15	June 15
Am. Car & Fdy pr..	60¼	62¾	60	61⅞	68½	Sept. 7	56¾	June 16
Am. Steel & Wire..	51¾	52¾	49½	51	72	May 4	45	Feb. 8
AmSteel & Wire pr	95	96¾	94⅜	95¾	106¾	Mar. 13	92½	Feb. 8
Am. Steel Hoop.....	42½	44	41⅞	44	45½	Sept. 25	24	May 24
Am. Steel Hoop pr	83⅜	85	82⅞	84¼	86¾	Sept. 14	70	May 13
Am. Tin Plate.....	37½	37¾	36	36	52¾	April 4	33	May 24
Am. Tin Plate pr..	85¼	85½	83½	83⅛	99¾	Feb. 8	81	June 1
Col. Fuel & Iron...	52½	56¾	52½	56¾	64	Sept 11	30⅛	Feb. 8
Federal Steel.....	53¾	55¼	52½	55⅛	75	Apr. 3	46⅜	Feb. 8
Federal Steel pr....	77¼	79	77	79	93⅜	April 3	73½	May 13
National Steel.....	50¾	51	48	49	63	April 24	43¾	June 2
National Steel pr..	94¾	95	94½	94½	99⅜	Aug. 11	85	May 15
Pressed Steel Car..	58	58	56¾	57	61	Aug. 14	44¾	June 1
PressedSteelCar pr	89	90	89	89⅞	91	Sept. 7	78	May 25
Republic Steel.....	26¾	27	25¼	25⅞	33⅞	Sept. 26	22¼	Aug. 26
Republic Steel pr..	70	71¼	70	71	79	Aug. 29	70	Oct. 2
Tenn. Coal & Iron	114½	118½	114½	118½	126	Sept 11	36	June 14

Pittsburg Foundrymen's Association.

The Pittsburg Foundrymen's Association held its annual meeting Monday night, Oct. 23, at regular headquarters, Frohsinn Hall, Pittsburg. The gentlemen placed in nomination by the committee at the last meeting were elected as follows: President, Dr. Richard Moldenke, of the Pennsylvania Malleable Co.; vice-president, S. D. Sleeth, superintendent of the Westinghouse Air Brake Co.'s plant; treasurer, Phillips Mathes, of the Brittan & Mathes Co.; secretary, F. H. Zimmers, of the Union Foundry & Machine Co.; executive committee, I. W. Frank, Wm. Yagle, Robert Taylor, B. D. Fuller, and E. A. Kebler. After the election some time was spent in chatting and the members and visitors sat down to a luncheon, which was much enjoyed. The fifty guests present entertained each other with stories which are especially appreciated by foundrymen, many of them being told from personal experience, and a very enjoyable time was had. Dr. Richard Moldenke acted as toastmster, assisted by Mr. F. H. Zimmers, and both gentlemen enteredveryheartily into the spirit of the occasion.

W. D. Crawford, who has been connected with the Shoenberger steel interests at Pittsburg for 18 years, has been appointed manager of the old Wellman plant at Thurlow, Pa., which is being started in operation by the newly formed Tidewater Steel Co., of Philadelphia.

THE manufacturers of iron and steel safes have just made another advance in prices.

THE SELLING SIDE OF THE TRADE.

Representatives of Well Known Iron and Steel and Equipment Firms.

One of the most popular pig iron salesmen in the West, and one of the oldest in point of service, is Bayard T. Bacon, of Pickands, Brown & Co., Chicago. Mr. Bacon has spent all but a few months of his business life in the pig iron business, starting in 1876 with L. R. Hull & Co., of Cincinnati. When this concern was merged with E. L. Harper & Co., in 1878, Mr. Bacon continued with them. In 1881 he went with Rogers, Brown & Co.'s, Cincinnati office and in 1886 went to Chicago, to become connected with Pickands, Brown & Co.,

BAYARD T. BACON.

the sales agents of the pig iron department of the Illinois Steel Co., and has been with them ever since. Mr. Bacon knows the iron business thoroughly and has helped largely in building up the reputation which Pickands, Brown & Co. have as reliable dealers in pig iron and coke.

Obituary.

Horace S. Smith, former vice-president of the Illinois Steel Co., died at his home in Chicago, Oct. 17, aged 73 years. Mr. Smith was born in New England and years ago was associated with Jay Gould. He went West after the Civil War, and engaged in the employ of the Chicago & Alton railroad. In 1875 he joined the Joliet Steel Co., and it was largely through his efforts that the Illinois Steel Co. was organized. Mr. Smith was elected vice-president of the latter company on its organization, and held the position until he was compelled to retire because of ill health. He was a member of the Union League, Chicago, and Kenwood clubs.

Stephen M. Reynolds, died at Avalon, Pa., Oct. 21, aged 56. For many years he was connected with the Oil Well Supply Co., and earlier was assistant manager of the Elba Iron Works and the Continental Tube Works.

James O. Pease, treasurer of the Phoenix Iron Co., died at Germantown, Philadelphia, Oct. 14. He was born in Washington, Miss., in 1818. He became connected with the Phoenix Iron Works in 1869.

THE Riter-Conley Mfg. Co., Pittsburg, has secured a contract to erect the building for the power station of the Glasgow municipal tramway. About 1,600 tons of steel work will be required, and the contract price is in the neighborhood of $150,000. The contract was secured in close competition with British concerns, and the time of erection was not an important feature, as has usually been the case when such contracts have come to the United States. The company has received a provisional order for a floating dry dock at Havana, to replace the one recently sold to Mexican parties for removal to Vera Cruz. The new dry dock is to be 360 by 90 feet, and will take about 1,500 tons of steel.

PROBLEMS OF HEAT TREATMENT.

BY "FURNACEMAN."

The increasing appreciation of heat conditions has been the means of clearing away the confusion of doubts and surmises, which have for many years attached themselves to all casting operations. Heat and its equivalents which are embodied in pig metal, are the nucleus of all possibilities contained therein. The caloric condition of blast furnace determines the grade of the product, and it matters not how carefully a theory for the burden may have been worked out, if the temperatures vary the calculation will be destroyed, for the metal will be influenced according to the amount of heat present.

There are many causes for an irregular working in stack, and the composition of burden is one of the least, for when fuel and atmospheric conditions are favorable, it is just as possible to produce a rich iron from a lean burden as it is from a rich one. After the iron has been cast, the conditions existing in blast furnace during casting will be reproduced in the metal and will be represented by the presence of several metalloids which are unquestionably dependent upon such conditions, for their appearance in the certain percentages which from an analytical standpoint determines one grade from another.

Heat Manipulation and the Metalloids.

Therefore, the chemical composition and grading fracture is again the direct consequence of heat manipulation. The heat of furnace when iron is tapped will be shown in the percentages of silicon and graphitic carbon present in the metal. A No. 1 iron with a high silicon and graphitic carbon content, will be a "hot" metal, and the No. 5, with low silicon and carbon, will be a "cold" iron, and there is no deviation from this rule irrespective of variance in practice.

The No. 1 iron may be remelted and refined at a lower temperature and be hotter, retaining fluidity longer than the No. 5 iron, which requires a higher temperature to melt, and when taken away from heat influence loses its fluidity and chills at once. Silicon and graphitic carbon are always present in ratio. The amount of graphite present is entirely dependent upon the percentage of silicon. It would be quite impossible in regular working, to have an iron with four per cent of silicon, and no graphitic carbon, and the reverse, four per cent graphite and no silicon.

Curiously enough, sulphur is also the product of heat working; it has, however, no bearing upon the fluidity of metal when remelted. The No. 1 or "hot" iron will contain but very little of it, while the No. 5 or "cold" iron, will have considerable, as this latter iron when passing the fusion zone in stack is very dull, and being spongy is an absorbent of impurities in fuel and slag. The evil effects of sulphur are very prominent when iron has been refined, and when worked under the hammer or rolls, we meet with the familiar "red-shortness."

Phosphorus appears to be the only metalloid which through all the variable conditions of furnace, manages to retain in a measure some proportion of its original calculation in burden. Its direct influence on metal being remelted is in turn also dependent upon the amount of heat which the metal is capable of developing. In gray iron and malleable casting it serves as a factor for fluidity. But in all grades of steel it is debarred on account of its well-known characteristic "cold-shortness."

Manganese has not, as a general rule, been as prominent in pig iron calculations as the other metalloids. Of late years the percentage has been gradually increased, hoping thereby to derive some benefit from its ability to slag off sulphur and its supposed effects upon the combination of carbon. Manganese has not, however, been recognized as a leading factor. It would appear that with careful consideration of heat conditions and their important bearing upon the chemical constitution of iron, we could derive some very beneficial knowledge which would have its bearing upon the physical status of the metal. This would have more reference to the iron casting industries than steel, for in the instance of the latter no matter what may have been the original heat conditions, all the latter are eliminated and there is substituted for the original contained factors, the highest degree of artificial heat possible.

Heat Treatment in Malleable Mork.

Therefore leaving steel out of the question for the moment, iron casting, and particularly malleable will be considered. Malleable is produced in many ways, some entirely out of the beaten course. Yet the material has always been maintained at a very uniform quality. It may be reasoned that underlying all furnace operations there has been an influence at work, which has not always been recognized, and was possibly this same heat theory. When a heat is made up for the malleable furnace the chemical and physical limits are almost always calculated by the analyses and grading. These figures vary in individual works, but are firmly established in local practices. After the heat is charged the first opportunity for heat treatment is presented, for here the chemical and physical make-up will be altered. Iron in air furnace is capable of resisting, without burning, an amount of heat, somewhat in excess of that which prevailed during first casting at blast furnace. The fluidity and heat of the metal will be governed by the average grading of mixture. Most important to be guarded against is overheating the metal —exposing it to the chance for burning. There are several things which warn the watchful of this contingency and when noted are of service. When the charge is high in silicon, and there is difficulty encountered in combining carbon after the metal is hot enough to pour, continued blast cannot but burn the oxide of iron. When the mixture is in this condition, there has been an excess of silicon, and in heats following the grade should be altered to overcome this trouble 'Burnt iron is worthless, for the oxide has been past its limit, and when this iron comes through the annealing oven there is no mistaking its history. Burnt iron may also be detected by the brown smoke from ladles showing thus clearly the volatilization of the oxide. The heat of the blast and furnace, in connection with the chemical complexion of the metal, plays the deciding part in casting details, etc.

The action of flame influence upon mixtures for heavy and light work is at once prominent, on account of its being directed toward the accomplishment of the same end, through different channels. In the instance of heavy work, the mixture being low in silicon, and possibly high in combined carbon, the flame from the beginning of heat will be exerting an oxidizing influence driving the small percentage of graphitic carbon into combination, and while the heat is "coming up," will further a higher state of combination. In a light work mixture with high silicon and graphitic carbon the flame, after bringing the iron to the melting point, will have to burn out some of the silicon, before the carbon will enter into combination. And here more than at any point in furnace heat practice, should the metal be given great attention. Too often will the metal be burnt at this moment, having lost, as it were, some of its factor for defense. A heat should never be exposed to a flame that is beyond the resisting powers of the mtxture. In other words, when the furnace is too hot, instead of a natural evolution being formulated in the metal, the silicon and carbon content is simply burnt out by this intense heat, the oxide being impaired at the same moment. This latter action is similar to that in the Bessemer converter; for when heat rises, after the passing of the silicon, the iron thus exposed is quickly scorched.

The action of the flame upon the metalloids has its bearing also upon physical standards. Again taking the mixtures for light and heavy work, it will be found that the physical results are governed greatly by the percentages of certain metalloids in the mixures. Heats for both classes of work may be made up of the same irons, in different proportions, to meet any specification required. A mixture high in silicon will offer, from the theory of the volatilization of a certain part of its silicon, an opportunity for the flame to "catch" the iron, while a heat lower in silicon repels any other action of the flame, other than that which liquifies the metal. Regarding the strength of these mixtures the high silicon-carbon cannot develop the tensile figures of the low silicon-carbon because the former will be an open metal, while the latter will be very dense. The lower the percentages of silicon and carbon that may be maintained for all classes of work, the higher will be the tensile strength and elongation. High tensile cannot be obtained from high silicon, for the latter has a disintegrating influence upon the metal in annoaling.

Silicon which stands as the exponent of a contained heat

factor cannot be overestimated as to its work in facilitating the passage of graphitic carbon: but after the metal has been poured into molds, its presence is deleterious, for it makes possible, by reason of its known heat containing qualities, the renewal of graphitic carbon. A heat for any special class of work should be so calculated and arranged that the silicon figure should not be higher than that which will allow the carbon to turn over, without the holding of metal in contact with flame to accomplish this purpose.

Chemistry and Carbon Conversion.

The conversion of the carbon in a malleable furnace should be worked on as nearly a chemical calculation as is possible, coupling theory with practice. Artificial heat will eventually overcome any deficiency in calculation, but a natural evolution is brought about by the iron being carefully adjusted This is essentially heat condition. All iron from the blas furnace is either gray or white, depending upon the action of hot gases upon the ores for the percentage of carbon present. The blast furnace theory of heat treatment is that the gases of combustion ascending through the furnace leave quantities of their positive elements to combine with the oxygen of the ores, that is carbonic oxide leaves carbon. This carbonic oxide absorbs the oxygen from the ores, and leaves the protoxide; the ore in dropping to the hearth will be composed of metallic iron and foreign matter. If this process is not well performed, and this of course is directly consequent upon the degree of heat generated, some oxide of iron will be left in the slags, to be eventually flushed off. Any ore which being thus treated, without its surplus of carbon from the gases, cannot produce anything but white iron. All the carbon for making gray pig metal must be in the ore before it sinks to the hearth. Therefore with a hot furnace and hot blast we assume a surplus of free carbon in gas mixtures, which carbon, if it is not chemically, is at least mechanically, mixed with the gas, and being very finely diffused, eventually pentrates into the ore.

The heat and pressure of the blast have almost the controlling influence in the blast furnace, and also the air furnace. The pressure of blast is the one factor which creates a heat condition. In blast furnace practice we find that the carbonic oxide liberated by the fuel unites with the ores, and afterwards enters into the composition of the metal. In air furnace practice we find the same gas liberated under dissimilar circumstances, and acting in a strictly adverse manner. If we thoroughly understood the character of pig metal, we could regulate for various mixtures some approximate pressure of blast required, The regular and constant pressure with which the blast enters the air furnace, no matter what may be the character of the iron, may account in a measure for many apparent irregularities in furnace operation and quality of metal when cast. For the remelting and refining of pig iron, regarding the pressure of blast, etc., there must be in the air furnace a condition the reverse of that which occurred in the blast furnace during the smelting. For example, if the mixture is made up of gray iron, which was produced under high thermic condition, a soft blast is preferable, because this iron contains a high degree of heat efficiency itself, and with a high pressure the danger of burning is greatly enhanced. If the mixture be composed of white irons originally created under low furnace heat there will be required to melt them a high pressure blast, for the substitution by artificial means, of a quality they do not possess.

Perfect Combustion Important.

Perfect combustion of air in reverberatory furnaces has much to do with the physical character of the metal, and it is of course consequent upon the heat generated in the fire hole. Imperfect firing means volumes of air passing through the furnace unburnt. It was to correct this last defect, that the blast was introduced over fire bridge walls. The heat of a combustion flame contains the amount of oxygen necessary to nourish the chemical and mechanical reactions taking place in the furnace. That flame influence in the furnace should be positive is a very important point, for if by any chance the combination of the metalloids is not thoroughly effected, there will be trouble all along the line Carbon must be in combination at the moment of pouring. If it is not, it will keep the iron porous, and oxygen in the anneal having access to the interior of the castings, will cause a reaction to ensue resembling decomposition. Carbon does not combine at low temperatures in the air furnace and the heat of the blast must be carefully regulated after the combination has been made. In the heat for heavy work, when the iron will average a No. 5, with its small percentage of silicon already oxidized, the carbon being also in combination, the blast will have to raise by its means, an artificial heat condition. If the metal in the air furnace were kept exposed to the flame long enough, the high temperature would eventually cause the combustion of carbon and steel would be the result. When pig iron is deprived of its carbon, its cohesion and ductility are increased, but if the amount of silicon is disproportionate to that of carbon the iron is beyond improvement and to offset this latter contingency, the addition of re-carburetting metal is made to steel before leaving the furnace.

The flame treatment should be given all care, in order to overcome, to the extent possible furnace losses. Much depends upon the quality of iron composing the charge, and this in turn depends upon blast furnace operation. Good soft grav iron or white iron generally furnishes metal of unfailing quality. Charcoal iron has always, on account of the absence of foreign matter, yielded more iron, ton per ton, than coke metal, the furnace loss with the latter often reaching 15 per cent of the entire charge. It is a seirous problem to suggest any method to prevent this great loss of metal. The general consideration of heat treatment and conditions will, it is believed, be of great service to the metallurgist, for it will acquaint him more intimately with the latent capabilities in the metal, and thus, coupled with analyses, will give him the history of the iron beginning at the blast furnace.

SILICA-GRAPHITE PAINTS FOR METALS.

TO THE EDITOR:

We find the following paragraph on page 13 of the Sept. 28 issue of *The Iron Trade Review.*

"Protective Coatings for Iron and Steel," was the title of a paper bv A. P. Lane before the 30th annual convention of the Master Car Painters' Association held at Philadelphia Sept. 12 15. The writer had had good results from a mixture of linseed oil and mineral brown. He had tested it with graphite on bridges. Pure graphite was undoubtedly good, but it is liable to be adulterated with silica, which has no wearing properties, although it is a good filler. The discussion showed a consensus of opinion that oxide of iron, graphite and carbon are the best pigments for painting on iron and steel."

Kindly permit us to have something to say on this subject. There was at the convention undoubtedly considerable misunderstanding as to the nature of graphite; and in fact the nature of graphite, or rather the varyir g nature of graphite, is not fully understood. The Dixon company make a silica-graphite paint, and advertise it as such; therefore the graphite cannot be said to be adulterated with silica, as the silica is put in with intent and for a purpose. We note in the paragraph quoted that "pure graphite is undoubtedly good, but it is liable to be adulterated with silica, which has no wearing properties, although it is a good filler." We regret that no mention is made as to why the silica is not possessed of good wearing qualities. The man who gave voice to this statement most certainly did not understand the nature of graphite and the nature of silica.

Silica is almost as refractory as graphite; it is attacked only by strong alkalis. We think, therefore, that very likely the speal er had in mind silicate of alumina, or, in other and plain words, clay. As mentioned above, the Dixon company are manufacturers of a silica-graphite paint. The graphite is the Ticonderoga graphite, chosen because of its flake formation, and because of its hardness and toughness. Ticonderoga graphite will outwear Ceylon graphite or any other form of graphite with which we are familiar, and we buy and sell all kinds. The silica is added not only because it is a most excellent filler but because it strengthens and hardens the coating, so that the coating of paint will better resist the wear and tear of storms of all kinds, and friction generally. It is to the graphite what the alloy is to the gold in a watch chain.

A silica paint is made and sold quite extensively in England but it is known to be a brittle paint. Graphite, especially flake graphite, forms an exceedingly elastic coating. Graphite paint with silica makes, all things considered, just as near an ideal protective coating as science and practice have been able to find. JOSEPH DIXON CRUCIBLE CO.

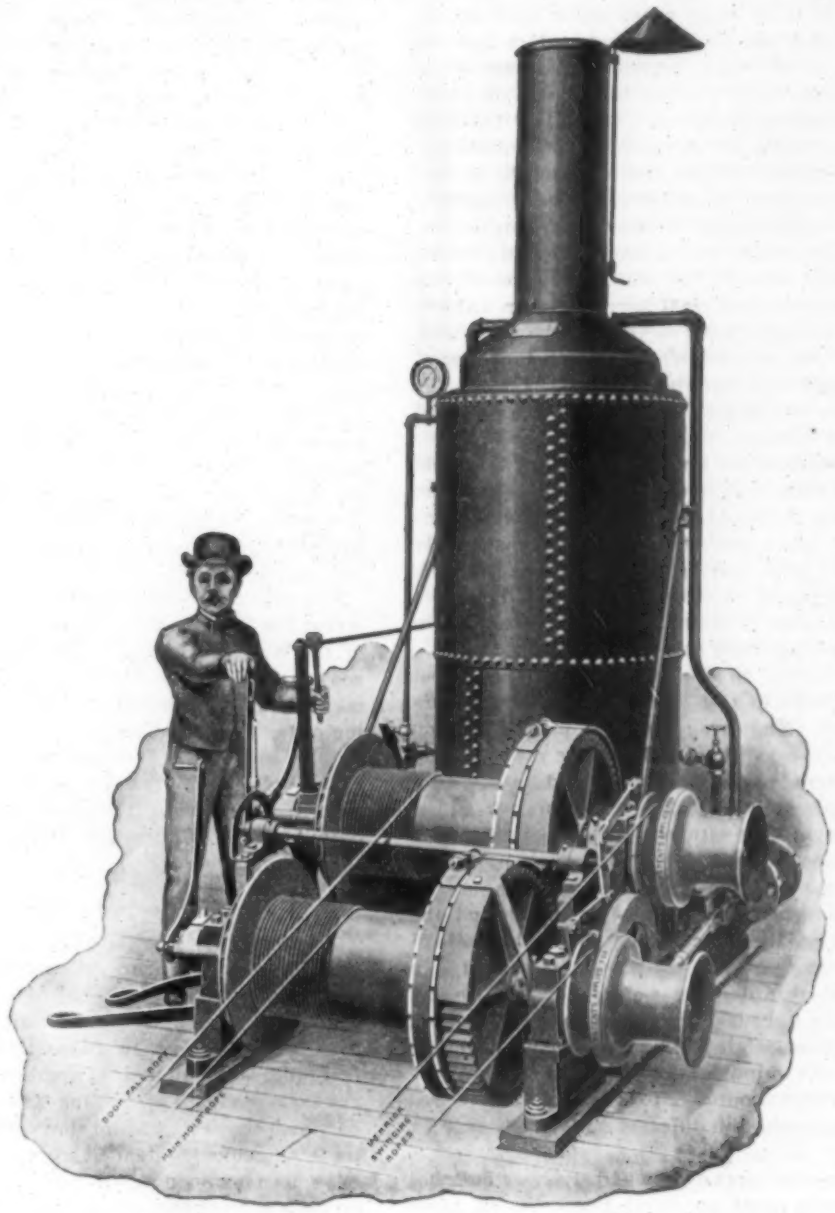
Jersey City, N J,

DERRICK ENGINE WITH SIMPLEX SWINGING GEAR.

An improved engine has been brought out recently by the Ligderwood Mfg. Co., New York, which will be known as the company's "99" derrick engine, with simplex swinging gear. It is of the standard Lidgerwood double drum type, with a patent attachment for swinging the boom of a derrick, that is simple and effective. The small friction drums which are used for the derrick swinging ropes are placed inside the winch heads and occupy very little space, leaving the winch heads available for use the same as with an ordinary double drum engine. Both these swinging drums are actuated by a vertical lever, arranged with a detent and quadrant, so that the lever may be applied and held by the detent in its position, without further attention on the part of the operator. The device is thus easily handled, and the operations of hoisting the load, raising the boom and swinging the boom, can all go on simultaneously with practically no more trouble than in handling an ordinary double drum engine. The winch heads are secured to the shaft by a sliding key or feather, and are of special form, having a sleeve upon which the swinging drum revolves; and a very powerful form of friction is used between the swinging drum and the winch head, so that the full power of the engine can be used.

The frictional contact is produced by cams placed between the swinging drums and the frame of the engine, while collars with anti friction washers are placed on opposite sides of the frame to take up the thrust. The operating cams are connected by links to the end of a lever, which is carried on a rock shaft extending across to the side where the operator stands, and where the vertical detent lever for operating the swinging device is placed. In the operation a rope is wound on the bull wheel of the derrick, and is secured to it in the center. Each end is secured to one of the two swinging drums, enough rope being wound on each to give the required amount of motion to the bull wheel. By throwing the lever forward it engages the friction clutch on that winch, causing it to rotate and winding in the rope, which turns the boom in one direction, the other winch meanwhile paying out the rope, as the cams are so construced that the same movement which engages one friction disengages the other. By throwing the lever backward the friction of the rear friction drum is engaged, and the forward friction drum is released. Thus, the boom can be pulled in either direction.

The cams operating the frictions are so constructed that when the operating lever is in the central position, there is enough frictional contact in the swinging drums to keep the ropes taut, and therefore, when one swinging drum is winding in the rope, the other drum has sufficient friction to prevent the rope which is paying out from over running. The means of adjustment is very simple, consisting of a nut on a stud bolt in the other end of each winch shaft. The construction of the friction is such that there is very little wear, and when the parts are worn, they may be replaced at a small cost, without impairing the main parts of the device.



The advantages of this swinging gear are that it occupies a small amount of space, does not add much to the weight of the engine, can be operated with little exertion, and requires little time in its operation on account of the detent lever, which holds itself in whatever position placed. An important feature is that it can be placed upon any of the Lidgerwood standard double drum hoisting engines either with or without boiler. Its great value comes from its large increase in the capacity of a derrick, and from the saving it works in the expense of swinging the boom by hand.

HAND AND MACHINE LABOR.

In 1894 a joint resolution was passed by Congress authorizing the Department of Labor to undertake an investigation of the effect of the use of machinery upon the cost of production, and of the relative productive power of hand and machine labor. The results of that investigation have just been made known. In the original resolution, the Commissioner of Labor was requested to ascertain the effect of machines operated by women and children upon rates of wages, and also as to whether changes in the cost of production are due to a lack or surplus of labor or to the use of labor-saving machinery. Commissioner Wright in his report, points out that statistics can give no direct answer to questions of this class, and confines his effort to showing what machines have done to reduce the cost of production.

It is explained that the terms "hand" and "machine" production are not used in their strict sense since hand operations enter to some extent into even the most modern systems of manufacture, while all hand production, on the other hand, in even the crudest arts, is aided by the use of tools, which are, strictly speaking, machines. The investigation is classified under the heads of Agriculture, Manufactures, Mining and Transportation; but, as would naturally be expected, the bulk of the work is devoted to manufactures. The saving of time in agriculture, however, is hardly less marked than in manufacturing operations. Thus to produce and harvest an acre of corn by the methods in use in the fifties is shown to have required 182⅔ hours of labor, as compared with 27 hours when the work is done by the machinery of the present day. An acre of wheat required 64 hours' labor in 1830, as against only three hours' labor in 1896. To harvest an acre of hay required 21 hours' labor in 1850, and only four hours' labor in 1895.

Turning to manufactures, we find a comparison of the old wooden mould-board plow compared with the modern iron plow. To produce one of the old fashioned plows required no less than 118 hours of labor, while the modern plow costs only 3¾ hours. In the brick-making industry hand work amounted to 20 hours per M. as compared with 7½ hours by machine. About the same proportionate saving was made in the manufacture of paving brick and of sewer pipe.

In the textile industries, nine-wire body Brussels carpet was woven on hand looms in 1850, with a labor expenditure of 4.04 hours per yard. The same carpet is now woven on power looms, with only a half hour of labor per yard. Cotton sheeting was made from the raw cotton by hand in 1860 with 5,605 hours of labor per 500 yards. In 1897 a modern cotton mill turns out the same goods with only 52¾ hours of labor. A large part of the labor consumed in the modern process is chargeable to hand manipulations still in use. Taking up the different operations involved in the production we find the most remarkable contrast in the carding. Here the ratio of the carding machine to the hand cards was 4140 to 1. In other words, it would require a man 1,980½ hours, or nearly eight months, working 10 hours per day, to card the cotton for 500 yards of gingham, while with machines he could do the same work in 28.7 minutes. In spinning, the ratio in favor of the machine was about 200 to 1; in reeling it was 350 to 1; in weaving it varied in different mills from 11 to 1 to 30 to 1.

Turning now to manufactures of iron and steel, we find that files are now made with about one-third the hours of labor that were employed by hand workmen in 1872. A rifle barrel took 98 hours' time of a hand workman in 1857, and it is now made with 3⅔ hours of labor. Half-inch bolts 6 inches long with nuts are made by hand at the rate of 500 in 43 hours, while by machinery the same product is turned out with only eight hours' labor. In the manufacture of iron pipe, 100 feet of 4-inch lap welded pipe cost 84½ hours of labor in 1835, while the same product was turned out with less than five hours' labor in 1895.

In lumber manufacture, the old-time method was to saw the logs into boards with whip saws, a method still practiced in some remote and inaccessible regions. To saw 100,000 feet of white pine boards by this method in 1854 took no less than 16,000 hours of work. A modern saw mill turns out an equal product with a labor expenditure of but 273 hours. In 1813 iron cut nails were made by hand, with a labor expenditure about 130 times as great as that required to produce an equal quantity of cut nails in a modern factory.

In quarrying, the modern compressed air drill can put down 30 holes 18 inches deep and 2½ inches diameter in granite rock, with 14 hours, 50 minutes of labor. The same task would require 80 hours' labor with hand drilling.

From these few illustrations selected from the large number of industries covered in this exhaustive report some idea can be gained of the great revolution which has come about in the civilized world during the past half century through the spread of labor-saving machinery.—[Engineering News.

Pullman's Palace Car Co.

Special interest attaches to the annual statements of Pullman's Palace Car Co., in view of the statements made in the panic years, of the inability of the company to pay the wages asked by its employes. The report for the year ending July 31, 1899, presented at the annual meeting Thursday, Oct. 19, is the first since the distribution of the special cash dividend of $7,000,000 last fall, and the additional stock dividend of $18,000,000, which brought the capital stock up to $54,000,000. The report published last week shows net earning equal to 9.76 per cent on the increased capital stock. The total surplus at the end of the year amounted to $3,792,188, or about 7 per cent on the capital stock. The total number of cars owned and controlled at the end of the year was 2,526 against 2,410 last year. During the year $1,00,000 was charged off for depreciation of cars, besides $202,846 for loss on cars sold or destroyed and for remodeling cars. But credit was taken for $816,465 for appreciation in value securities. The earnings of cars in the year were $9,748,577, and receipts from manufacturing, rental etc., $1,730,353; total, $11,478,930, against $10,674,868 in the preceding year. Total expenses, $6,033,915, making the net earnings, $5,445,014. The dividend was $3,149,550, leaving the surplus for the year, $2,295,464. The assets are $57,792,188, including $22,993,950 in cars and equipment, $8,221,786 in Pullman plant, $8,701,050 in securities, and $5,104,065, cash.

The official announcement of the Pullman-Wagner combine s that the Pullman Co. will purchase the assets and property of the Wagner Company and pay therefore $20,000,000 in 200,000 shares of the Pullman company, increasing the capital of the latter company correspondingly. A special meeting of the Pullman Company's stockholders, Dec. 5, will act on the matter. It is understood that the board of directors of the Pullman Co. is to be increased, and that Messrs. William K. Vanderbilt, J. Pierpont Morgan, Frederick W. Vanderbilt and Dr. W. Seward Webb, will become members of the Pullman board.

Readjustments in Tin Plate Manufacture.

The American Tin Plate Co. has already completed a number of changs in the properties which came into its possession nine months ago. Several of the plants, which were small and poorly located, have been torn down and the machinery removed and set up in connection with other plants more favorably situated, and a number of other similar changes are to be made. These changes are in line with the principles on which the new iron and steel corporations are working. The trade agreements intended merely to advance prices, which have been common in the iron industry for years, depended on their success only on an advance in prices. They were too ephemeral to introduce economies of production, and the usual course was to shut down the smaller plants and bolster prices by creating a scarcity. Under the new order of things there is no occasion for such practices. Plants which are poorly located are not abandoned, but are simply removed to better locations. There is no reduction in the amount of labor employed, but merely a change of base, and the increased economy of operation secured brings an increased profit. The old trade combinations sought definitely to decrease production; the present "trusts" seek to reduce costs and increase production.—[Tin and Terne.

The Monarch Works, Peoria, Ill., wishes to contract for building all kinds of machinery, engines, pumps, elevators, rolling mill machinery and repair work, east, west, north or south. They have one of the largest plants in Illinois and are able to promise quick delivery.

BUSY ST. LOUIS INDUSTRIES.

The Heine Safety Boiler Co. reports an increase of about 100 per cent in business as compared with last year and is enlarging its capacity by building a new shop at Phoenixville, Pa., which will employ about 100 extra men. The company has large shops at St. Louis, Troy, N. Y., and Chicago. The boilers manufactured by the company are of the water tube type and are in use throughout the United States and also in Australia, Japan and Russia and South Africa. The company was established in 1885 and has acquired a wide and enviable reputation.

The Wrought Iron Range Co. reports an increase of about 50 per cent in this year's business as compared with 1898, the September sales showing an improvement of 100 per cent. The concern was established in 1864 and has grown to be one of the largest exclusive manufacturers of ranges in the world. The well-known "Home Comfort" range is in use throughout the United States, Canada, Mexico, and also in foreign countries. These ranges are made of steel and malleable iron, and a sheet range is also manufactured. Important branches of the company are established at Ontario, Canada, Denver, Col., New Orleans and East St. Louis. Upwards of 1,000 men are employed, including 400 traveling salesmen, and with present capacity the company produces about 125 regular stock ranges and 25 sheet ranges a day.

Stevenson, Field & Co., dealers in pig iron and foundry coke, have increased the volume of business ten-fold since succeeding the St. Louis firm of Lee, Chamberlain & Co., in 1896. They deal in well-known brands of iron and sell throughout the United States and Canada. The following grades of pig iron are adapted to a large variety of foundry work: "Dayton," "Crescent," "Florence," "Woodstock," "Hanging Rock," "Leetonia," "Rock Run," "Lawrence," "Pencost," "Bessie," "Eagle," "Elsie." The firm has headquarters at Columbus, O., and employs four traveling salesmen.

Rogers, Brown & Co., through J. C. Mears, their St. Louis manager, have been rapidly increasing their sales in that district, the business for September aggregating more than for any three months of 1898. An order has recently been booked for the entire output of a furnace for the first eight months of 1900. The general offices of the firm are at Cincinnati, O., with branches at St. Louis, Buffalo, New York, Philadelphia, Chicago, Boston and Cleveland. The company's last statement shows sales of over 1,000,000 tons of pig iron for the first eight months of 1899.

Shickle, Harrison & Howard Iron Co., of St. Louis, is running to the full limit of its capacity and could do much more work if it had room. The company at present employs 900 men, but when the new plant at East St. Louis is completed (probably by January, 1900,) will have from four to five times the present capacity. The company is manufacturing steel castings exclusively, making railroad work a specialty. It has an extensive trade in car trucks of different kinds, bolsters and couplers, all of which are made from its own designs and patents, and are in use on many of the leading railroads of the country. Heavy steel castings for machinery of various kinds are also manufactured.

The Shultz Belting Co. reports an increase of 20 per cent in business over that of 1898. Aside from its trade in the United States and Canada the company has a large export business, being one of the most extensive manufacturers of belts in the world. The product is known as the "Shultz patent sable rawhide belting" and is adapted to all kinds of machinery. The business was established in 1876, and incorporated in 1877. Besides branches in New York, Boston and Philadelphia, and agencies in other leading cities of the United States, there are agents in Great Britain, Russia, Sweden, Denmark, Norway, Italy, France, Belgium and South Africa.

The American Steel Foundry Co., with general offices in St. Louis, is making extensive improvements at its works in Granite City, Mo. Secretary Pulliam estimates an expenditure there this year of about $250,000. The new building will be 400x210 feet and when completed will double the present capacity of the works. The company has been working its force 24 hours a day since June, 1898, and keeps 1,500 men employed. A large business is done in steel truck bolsters, steel body bolsters, steel M. C. B. couplers, center plates, and other railroad castings. The company was organized and incorporated in 1894.

The Arthur Fritsch Foundry & Machine Works show a steady increase of output and are doing about 50 per cent more business than at any period of 1898. The present establishment succeeded the old St. Louis firm of Rankin & Fritsch and dates from the fall of 1896. The products consist of crushing rolls, jigs, sectional jaw crushers and complete concentrating plants, and are sold mostly in the Central West, Southwest and as far as the Pacific coast.

The St. Louis Iron & Machine Works is steadily increasing its output. The business was established in 1854 and incorporated under its present name in 1875. The company manufactures Corliss engines, brick machinery, marine engines, and does general engineering and machinery work. It also makes all its own castings. The products of the works are sold through out an extensive territory and in their manufacture furnish employment to 150 men. The volume of business today is about 50 per cent above that of the corresponding period of 1898.

Merchant & Co., Inc., of Philadelphia, New York, Brooklyn and Chicago, invite all interested in their line of goods to visit their exhibit at the National Export Exposition now on at Philadelphia. The exhibit is in section D-6, main building. The company will have representatives there at all times. The exhibit is a novel one, consisting of a handsome booth covered with their well-known Merchant's Spanish tiles, and having two star ventilators, one of the Standard form and the other of the glass top skylight form. Above this roof there is an apparatus which distributes water in the shape of rain, so that the visitor has a practical example of the value of good roofing as a protection against the weather. Within the booth is a full line of the product of the Merchant smelting works, consisting of a large line of Babbitt metals as well as every description of solder and newspaper metals, and a full sample line of Merchant's high grade roofing and bright tin plates and metal ceiling; also brass tubing, which they handle in large quantities.

Beaudry & Co., of Boston, Mass., manufacturers of power hammers, heavy presses and drop hammers, have opened a Western office at 1522 Monadnock Block, Chicago, under the management of A. W. Johnson and C. E. Noyes. Mr. Johnson has been connected with Beaudry & Co. for some time, and having a knowledge of machinery is thoroughly equipped to handle this business.

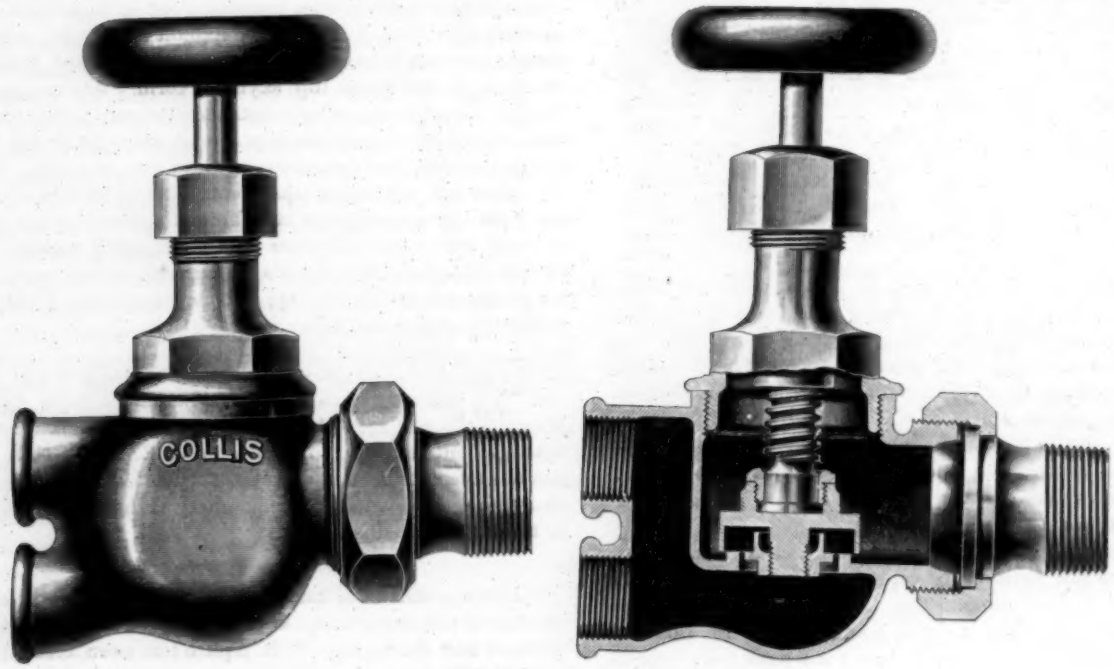
The Metal Sales Co. has been incorporated under the laws of Ohio to sell the product of the Magnolia Metal Co. in Ohio, Indiana and Michigan. F. B. Squire has been elected president and Howard E. Cole, secretary and treasurer. The sales headquarters of the company are at 15 South Water st., Cleveland. Magnolia anti-friction metal for machinery bearings is in very extensive use in the territory of the new company and the intention is to push its sale and to further enlarge its market. The Magnolia Metal Co. reports a very rapid increase in its sales since the beginning of the revival in machinery, metal and engineering trades.

The advance of 5 per cent on all grades of stoves and stove repair castings which was determined upon at a meeting of stove manufacturers in Chicago, was put into effect Oct. 15. The advance covers all territory of the Louisville, Evansville, Northern Ohio and Southern Associations. New terms of sale were also inaugurated. Heretofore the manufacturers have sold their goods to the jobbers and retailers upon a 5 per cent cash payment, with 30 days' time on the balance. According to their decision at the Chicago conference, purchaseser must pay the manufacturers 2 per cent of the purchase price and the remainder within 10 days from the date of purchase.

The Hastings Iron & Engine Works, at Hastings, Mich., have purchased additional property and will branch out in the manufacture of hot air registers, sink basins, etc., putting in extensive japanning works and foundry.

THE COLLIS CIRCULATING VALVE.

In the illustrations herewith is shown the Collis circulating valve that is being manufactured by Jenkins Bros., 71 John st., New York. It is specially designed for heating apparatus to overcome the troubles which arise from closing the supply valve without closing the valve on the return pipe, for it avoids the necessity of the return valve and reduces the cost of construction work by making the one valve do the work of two. The construction provides for a continuous circulation and supplies the steam to the radiator immediately on opening the valve. The continuous circulation prevents the return from becoming filled with water that under the two valve conditions allowed the water to be drawn into the radiator to fill the vacuum caused by condensation of steam when the supply valve only was shut off. It is pointed out that with it only dry steam reaches the radiator, which is more quickly heated, and less trouble arises from the use of good automatic air valves of the expansion type and that float valves are unnecessary. It allows a complete circulation at all times, and a radiator may be connected without shutting down the entire plant by simply shutting off the valve, a great convenience in temporary heating plants in new buildings. The noisy water hammer is also avoided by its use. The valve can be adapted for use with any of the automatic heat regulating systems by removing the regular bonnet and substituting the diaphragm bonnet and trimmings of the system to be used. It is made in three sizes, with 1¼, 1½ and 2 inch radiator supply and ¾x¾, 1x1 and 1¼x1¼ inch steam supply, and return connections for radiator having 60, 100 and over 100 feet of radiating surface.



COLLIS CIRCULATING VALVE.

A Scrap Metal Consolidation.

Plans are said to be under way for a consolidation of smelters of scrap metal into a company to have a capital of at least $20,000,000. Options on the leading concerns in New York have been obtained, and also upon companies in Boston, Cleveland, Pittsburg, Chicago and other cities. Twelve concerns, it is said, are now under option, the largest doing a business of $4,000,000 a year. The New York *Commercial Bulletin* says: "The manufacturers interested deal in various kinds of scrap metal, such as copper matte, copper residue and type metal. In the past a great deal of such metal has been exported to Europe, especially to England for smelting, because of the lack of sufficient facilities in this country. With the various concerns united, with a large working capital, it would, it is argued, be feasible to put up large works suitable for the smelting of this material at home. The promoters of the consolidation are Wechsler & Louis. Brown & Wells are the attorneys.

ELECTRIC TRAVELING CRANE MOTORS.

Owing to the fact that crane-motors are "intermittent workers," motor manufacturers have been in the habit of supplying machines too small for the work for which they are intended. They rely on the capacity of the machine for developing an addition 75 to 100 per cent for short periods, and thus bringing the maximum horsepower up to what has been specified. The results in some instances have been curious, not to say disastrous. For instance a crane maker might order a 10 h. p. for his hoisting motor, knowing that he has aright to expect that machine to develop 17 to 20 h. p, for short periods, providing it is properly rated. But the motor maker supplies a 6 h. p. machine, doubtless appeasing his conscience by his knowledge of the fact that it will develop 10 h. p. intermittently. The consequences are what might be expected—injurious heating, excessive sparking at the commutator, frequently broken wires in the armature, and the total failure of the motor after a few monhs of dissatisfaction. Latterly the best makers of electric cranes have the motors so arranged that worms, worm wheels and bevel gears and their concomitant evils are entirely dispensed with. In the earlier types, the power from the hoisting motor was transmitted by means of a worm to the hoisting gear, the idea beng to make the crane self-sustaining without the use of a brake. Experience has proved that this arrangement, where heavy work is concerned, is not reliable since in one instance a crane, constructed on this principle, allowed its load (a partly finished locomotive) to take charge of the motor and run down with a dangerously high velocity. Usually spur gearing is now used throughout in conjunction with an automatic magnetic brake. When current is switched on to the hoisting motor it puts into circuit an electro-magnet possessing sufficient power to raise the brake lever and render it inoperative at the moment that hoisting or lowering commences and also during its continuance. The act of "switching off" immediately, and without any attention whatever on the part of the operator, allows the brake to be automatically applied. It is necessary that the brake lever be fitted with a damping arrangement so as to prevent the excessive shock to the gearing that would otherwise arise in the event of the brake being too suddenly applied. The advantage of the magnetic brake is obvious. If from any reason during working operations, the current should fail, the brake lever would be instantly released, and the brake would take charge of, and sustain the load. Mechanical brakes of various designs and principles are sometimes used in connection with the magetic brake just described.—[Arthur Parrott in Cassier's Magazine for November.

The Carp Furnace at Marquette, Mich., went in blast Oct. 18 under the management of Schaffer & Gray. It has been out since 1891.

RECENT INVESTIGATIONS IN STEEL.*

BY H. SYLVESTER, BIRMINGHAM, ENGLAND.

The employment of analysis in the production and controlling the quality of iron and steel practically dates from the introduction of the Bessemer process. The demand made upon analysis at the present time is shown by a statement that in the laboratory of the works of the North-eastern Steel Co., Ltd., no less than 100,000 determinations are made in the course of a year. The accumulation of results, combined with mechanical tests, have enabled fairly definite limits to be draw up as regards the ultimate composition of the steel to be used for various purposes; but elementary analysis does not give us much information as to the causes of the many physical changes produced by heat, rate and circumstances of cooling, and the different conditions under which steel is worked, and which seriously affect its mechanical properties. The joint effects of elementary composition and physical treatment on the constitution of the steel are therefore being studied by the aid of the microscope, and Stead and Ridsdale working on mild steel, have already accumulated a considerable amount of information on the structure of that material and the conditions which tend to produce a brittle unreliable metal.

The question, "Why does steel harden?" has called forth an enormous amount of research, and, with the aid of the microscope and the recording pyrometer, some remarkable phenomena have been observed. The results obtained were no doubt regarded originally, and probably are still regarded in that light, by many as mere academic interest; but whether the various and divergent explanations of the cause of hardening be true or false, the facts on which the arguments are based remain, and have added greatly to our store of knowledge on the important question of the thermal treatment of steel.

Until the year 1885 not much light had been thrown on the condition of carbon in steel, but then Sir Frederick Abel and others showed that it existed in at least two forms, namely, as carbide carbon or iron carbide, Fe_3C, in which state it was found in soft metal, and also as hardening or free carbon, as was then supposed, in the hardened metal, both varieties occurring in tempered steel. Recent investigation has modified the view that hardening carbon is necessarily free carbon. On heating steel to redness the carbide carbon was transformed into hardening carbon, and on cooling the condition of that element in the steel was dependent on the time taken for the cooling process. If slowly effected there was a transformation again into the carbide carbon, whilst by rapid cooling this change was not produced, the hardening variety remaining in the steel. Both Prof. Ledebur and Arnold have confirmed the presence of carbide carbon, Fe_3C, and the latter also claims the existence of a sub-carbide, $Fe_{24}C$. The accurate determination of the temperature at which the transition from hardening carbon to carbide carbon occurred, and the description and identification of the heat phenomena with which the change was attended, with the recalescence point of Gore and Barret, had yet to be given.

Such was the condition of our knowledge when Osmund made the observations that are largely responsible (*I. and S. I. Journal*, 1890, vol. i.) for the voluminous literature with which various "Transactions" are flooded at the present time. Briefly described, the investigation consisted in heating steel, and then by means of the delicate pyrometer of Le Chatelier noting if the fall of the temperature proceeded with regularity—that is, a drop of an equal number of degrees in equal spaces of time. Experimenting first with practically pure carbonless iron, he found that the fall of temperature was delayed at three well-marked points, the first occurring between the temperatures 845 degrees C. to 800 degrees C., the second 755 degrees C. to 710 degrees C., and the third between 680 degrees C. and 645 degrees C. For clearness these temperatures, with the symbols used to designate them, are tabulated below:—

	Commencement.	Maximum between.	Conclusion.
Ar_2	845° C.	825—819° C.	800° C.
Ar_2	755° C.	736—725° C.	710° C.
Ar_1	680° C.	662—655° C.	645° C.

This delay in cooling was with practically pure iron most marked in the first interval, and least in the last. These points Osmund calls critical points, and it is to be noted that they do not occur between the same temperatures in all classes of steel. As the percentage of carbon in the steel increases, the first and second retardation, Ar_2 and Ar_3, gradually merge into one another, while in hard steel there is only one prolonged arrest, which practically corresponds with the point Ar_1, or the temperature at which hardening carbon is transformed into carbide carbon. It is evident then that the disappearance of the critical point Ar_2 and Ar_3 in hard steel is connected with the increased percentage of carbon in the metal.

Such are the remarkable results attained by Osmund, and in order to throw further light on them the aid of the microscope was sought to determine the proximate compostion of the steel. The principal micro-constituents of steel are ferrite, cementite, pearlite, and martensite, and the presence or absence or preponderance of some of these consituents depends on the heat treament to which the metal has been subjected and also on the carbon contents of the steel. Ferrite consists of almost pure iron, and is the chief constituent of soft and unhardened steels. Cementite is a carbide of iron, Fe_3C which has already been referred to as having been isolated by Sir Frederick Abel. It is distinguished by its hardness, and is present in quantity in an unhardened high-carbon steel. Pearlite consists of alternate bands of ferrite and cementite, and occurs in annealed steels, or those that have been cooled down slowly from a high temperature, or quenched at a temperature below the critical points. Howe names the ferrite of pearlite "segregated ferrite" to distinguish it from the first-mentioned micro-constituent. Martensite is the characteristic micro-constituent of hardened steel and the structure it represents is supposed to exist in the metal at a high temperature, the change in the other forms being a function of time. With slow cooling martensite is replaced by ferrite and pearlite, but if the metal be quenched above the various critical points varying percentages of martensite remain in the steel, dependent on the carbon content and the particular critical point above which the quenching was effected. The proportions of these micro-constituents in steel from the softest to the hardest variety, and in steels quenched at temperatures above, between, and below the critical points, have been accurately determined by Osmund and Laisueur, and as a result of their work it is established that changes in the micro-structure of the metal occur at the various critical points, and in a range of temperature where there is no critical point there is an absence of change of structure. The proximate composition, then, of steel supplies a key with which to study the effects of the heat treatment on the character of the metal.

These are the chief facts that have been ascertained in connection with the hardening of steel, and to explain the phenomena there are two main theories, known respectively as the "allotropic" and the "carbon." According to the first theory which was brought forward by Osmund in 1890, iron, like carbon, phosphorus and sulphur, assumes three allotropic or distinct physical conditions, and the various arrests in the rate of cooling when iron practially free from carbon is slowly cooled are evidence of the passage of the metal from one state to another. Above the point Ar_3, the iron is in what is called the "gamma" state, and just above this temperature the electrical resistance in steel is ten times greater than what it is at ordinary temperatures, but does not increase with a further rise. The evolution of heat at the point Ar_3, is due to the passage of the iron from the "gamma" to the "beta" or hard state, in which condition the iron is non-magnetic. The point Ar_2 indicates the conversion of hard "beta" iron into "alpha" or soft iron, and below this point the metal is magnetic. The point Ar_1, which in very low carbon iron is not very distinct, indicates the conversion of any carbon that may be present from the hardening form to the carbide form. Now the presence of carbon in the hardening state tends to maintain the iron in the "beta" or hard brittle form, and consequently, as the percentage of carbon increases, the temperature at which the change from the "beta" form to the "alpha" occurs is lowered, until with high-carbon steels there is only one prolonged arrest between 680 degrees C. and 640 degrees C., which corresponds with the temperature at which carbide is formed. By rapid cool-

*From the presidential address before the Staffordshire Iron and Steel Institute, October, 1899.

ing of the metal the carbon remains in the hardening state and thus prevents the transformation of the "beta" iron into the "alpha" or soft variety. Osmund says, "Hardened steel is a steel in which the iron and carbon have preserved more or less completely in the cold the condition which they possessed at a high temperature. I conclude that hardened steel owes its properties principally to the presence of beta iron which is hard and brittle by itself at the ordinary temperature. The influence of carbon is of the same character as that of the rate of cooling, and both combine to produce the final result. The rate of cooling alone is not sufficient under the ordinary conditions in which hardening is effected to maintain an appreciable portion of the iron in the beta condition. But as under the same conditions it is easy to maintain the state of hardening carbon, and as the hardening carbon imparts stability to the beta iron, it is evident in what manner beta iron may be successfully preserved down to the ordinary temperatures by the aid of carbon."

The carbon theory was advanced by Prof. Arnold in 1894 (*I. and S. I.*, vol. i. 1894), and in a remarkable paper he strongly opposed the contention that allotropy plays a part in the hardening of steel, which, he contends, is due to carbon per se. In his communication he concludes that the point Ar_1 denotes the carbon change, and that its intensity is proportional to the amount of carbide carbon present. The middle arrest Ar_2, he can only conclude is due to the fain, evolution of heat produced by the passage of the iron from a plastic to a crystalline condition, whilst the first arrest marks the dissociation of a sub carbide of iron $Fe_{24}C$. There is a further theory by Prof. Howe, designated the "Carbo-allotropic theory," and to the accumulation of evidence by the partisans of these various explanations we owe the great extension of knowledge on the constitution of steel. It would be wearisome here to go into the various phenomena which are claimed as supporting or damaging these theories, but a readable summary, as far as the subject can be made readable, is given by Messrs. Harbord and Twynam in the 1897 journal of the sister society—the West of England Iron and Steel Institute. My object in alluding to this matter at some length is to indicate the direction taken by research at the present period, and give an idea of the wide field of investigation that the new methods have opened up. An idea of the practical character of the information already won is to be obtained by a perusal of the papers on "The Brittleness of Mild Steel" in the Journal of the Iron and Steel Institute for the year 1898. The history of the heat treatment of a piece of steel is embodied in its constitution, and these new methods of investigation are slowly but surely enabling the significance of the characters inscribed therein to be read aright.

American Iron and Steel in Germany.

Vice Consul-General Hanauer, at Frankfort, has sent to the State Department an extract from the annual report of the Chamber of Commerce of Bochum, which comprises the leading manufacturers for this prominent iron and steel district of Germany. It says:

"American competition, which in 1897 arose in the continental markets, has made further progress during 1898. Pig iron exported to Germany has increased 16 per cent, as compared with the imports of the year previous, fine cast iron and wrought iron 28 per cent and common ironware 75 per cent, while the import of bicycles and parts gained 106 per cent. The value of the American articles imported into Germany in 1897 amounted to 10,100,000 marks; in 1898, 15,800,000 marks ($2,380,000 to $3,570,000). This extraordinary increase in so short a time give cause for a very serious concern, especially when it is considered that the demand in the United States had advanced enormously, so that no large stocks were available for foreign export. Consequently we have to reckon with certainty that the import of American iron and steel will continue to increase; to prevent it will require strenuous exertions on the part of the German works. Above all, we must have lower freight rates. Without these it will impossible for the Rhenish Prussian manufacturers to compete in future with American goods, which gain great advantage from the astoundingly low rates of railroad freights."

It is proposed to remove the Mitchell-Tranter plant of the Republic Iron & Steel Co. from Covington, Ky., to some more advantageous point.

MODERN FOUNDRY AT CHICAGO HEIGHTS.

Announcement has been made in these columns of the removal of the Sargent Co.'s foundry plant from 59th and Wallace sts., Chicago, to Chicago Heights. The iron foundry building at the latter place will be ready Jan. 1 and this department of the plant will then be moved, and the crucible steel department dismantled, leaving at Chicago only the open-hearth plant for the manufacture of steel castings. There are two main buildings at Chicago Heights, separated by a court 40 feet wide and joined at one end by the cleaning room. One of the main buildings will be the steel foundry and the other the iron foundry. The *Railroad Gazette* gives the following details:

The steel foundry building will be of brick, 200 feet long with one clear span of 50 feet and a 30-ft. annex, making a total space of 80 feet by 200 feet. The 50-ft. floor will be served by two 15 ton Shaw electric traveling cranes with 3-ton auxiliaries and a number of air hoists. Inside the melting room, which is located at the north end on the court side of the foundry, will be placed two 60-inch cupolas, the blast for which will be obtained from a large fan driven by an electric motor. Just opposite these cupolas in the foundry building proper will be three Tropenas converters, each with a capacity of two tons, and these will be turned by special gear; the blast for the converter at pressures up to 4 lbs. being furnished by a blower geared to a 50-h. p. electrical motor. The Tropenas process, for making small steel castings and castings for electrical and other work formerly made of crucible steel, was adopted after an investigation of European methods. This process makes use of a special converter invented by Alexandre Tropenas, and is used to a considerable extent abroad.

The iron foundry will have a capacity between two and three times that of the 59th st plant, and will be used exclusively for casting brake shoes. It will be 200 feet long, with a clear floor space, 80 feet wide. The cupolas, one 60-inch and one 72-inch, will be placed in the melting room on the court side at the south end of the foundry and eight pneumatic molding machines will be placed in line lengthwise of the foundry and on the side opposite the melting room. The molten metal will be carried lengthwise of the foundry in a large reservoir ladle, traveling on a narrow gauge track; from this ladle it will be delivered to bussy ladles, each operated by a single man, which are wheeled back and forth to the molds over the iron plate floor. This system of pouring has been used for a number of years in the 59th st. works with considerable success; the pouring gang is continuously employed at this work during the entire day. This department will have a 5-ton power jib crane and a number of air hoists. The blast for the cupolas will be obtained from fans driven by electric motors.

The core room and cleaning room will be located so as to be equally convenient to each foundry, and will be fully equipped with rattlers and emery grinders, all driven by electric motors. Castings after being finished in the cleaning room are to be loaded directly into cars standing on a depressed track, which runs the length of the room, 200 feet. All foundry supplies, such as molding sand, limestone, coke, clay, etc., are to be delivered in cars on stub tracks entering the court between the buildings. Pig iron and scrap will be piled beside the track in the yard but a short distance from the cupola elevators. There is ample space on either side of each foundry for the storage of flasks.

The power house is to be separated, but, like the other buildings, will be entirely of brick and stone, 52x108 feet 7 inches. In this building there will be two 72-inch horizontal tubular boilers, 18 feet long, equipped with special rocking grates and blowers, together with two large feed pumps and a 300-h. p. feed water heater. In the engine room will be located an 18x42-inch girder frame Reynolds-Corliss engine, built by the E. P. Allis Co; a 150-k. w. generator, built by the Western Electric Co., and a 100-h. p. duplex compound air compressor. A separate switch track is to be provided for bringing fuel supplies to the power house. The whole plant is so designed as to permit of its capacity being doubled, as it is expected that the open-hearth steel department will eventually be removed from 59th st. to the 10-acre lot adjoining the new Chicago Heights plant on the north. The iron foundry and the Tropenas steel foundry are also laid out so that the capacity of each can be doubled by extending the cuildings to the south, and without interfering with the system of handling the raw and finished materials.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:—

Incorporation papers were filed at Columbus, O., Oct. 21, for the Dietz Machine & Tool Co., of Cincinnati, with a capital stock of $25,000. The incorporators are Jacob Dietz, William Lodge, Murray Shipley, Jr., Fred. A. Lamping, and Louis J. Dolle. They will erect a shop building on Colerain ave., and manufacture lathes exclusively for the Lodge & Shipley Co.

The Bessemer (Ala.) Rolling Mill Co. has been incorporated with $165,000 capital by Robert Jemison, Morris Adler, Albert Adler and Edgar L. Adler. Morris Adler was made president, Edgar Adler vice-president, and Maxwell Coffin, general manager, secretary and treasurer. The property has been held in trust under foreclosure. Considerable of the new stock has been taken by persons interested in the old company. The plant is to be put in operation at an early date.

A $50,000 soil pipe enterprise is about to be started in Chattanooga, by the Chattanooga Pipe & Foundry Co. The incorporators are J. F. Casey, Charles Reif, M. M. Hedges, George Reif, Jr., and Robert Pritchard. Messrs. Casey and Hedges will be actively in charge of the plant, which will be located next to their large boiler works in South Chattanooga. The site has been bought for $7,500.

The La Fayette Bridge Co., La Fayette, Ind., will buy one or two new lathes, a dynamo and other equipment for its rebuilt plant.

The Atlantic Iron & Steel Co. is to be chartered under Pennsylvania laws with $20,000,000 capital. It will take over the four iron and steel properties controlled by Charles A. Porter, Dr. L. Filbert, Kenendy Crossan and F. C. C. Kauffman, namely the Susquehanna, New Haven, Danville-Bessemer and Birdsboro Iron & Steel Companies, all of Pennsylvania except the New Haven rolling mill property.

F. S. Hoog, McKeesport, Pa., wants a 125 h. p. boiler and engine, new or second hand.

M. F. Williams & Co., 2701 North Broadway, St. Louis, Mo., will buy a large-size punch and shear, either single or double.

Hardie-Tynes Foundry & Machine Co., Birmingham, Ala., is in the market for a fast running planer, about 36 inches, also good lathe from 22 to 28-inch swing, 6 to 8-foot centers, fitted with turrett attachment, also second hand steam hammer 10,000 to 12,000 pounds.

The Cassapolis Mfg. Co., of Cassapolis, Mich., has been incorporated, capital $50,000, and the Huron Machine Works, of Port Huron, Mich., capital, $5,000.

Niagara Frontier & Electrical Machinery Co., of Niagara Falls, has been incorporated. Capital $15,000. Directors, Robert D. McIntyre, and Edward E. Tuthill, Niagara Falls.

F. E. Vaughn, of Richmond, Ind., who has invented several machines and appliances, expects to locate a foundry and machine works at Pendleton, Ind.

The Grand Rapids (Mich.) Malleable Iron Co has elected officers and will begin work Nov. 1 on its new buildings. Several acres of ground will be needed. Five air furnaces will be built and the capacity will be 15,000 tons a year. The officers of the company are: President, Edward Lowe; vice-president, Henry Idema; secretary, D. M. Ray; treasurer, H. J. Hollister; members of board of directors, I. Preston Rice, Edward Lowe, J. C. Holt Henry Idema, J. P. Ray and William H. Moore.

The new company which will secure the J. P. Witherow plant at New Castle, Pa., will apply for a charter as the Pennsylvania Engineering Works, on Nov. 14, with the following board of directors: William Patterson, James Reis, George Greer, E. N. Ohl, and Edward King. Among the prominent stockholders are W. E. Reis, E. C. Darley, George P. Berger, John M. Watson, Capt. M. S. Marquis, and R. C. Patterson. The Pennsylvania Engineering Works will be capitalized at $150,000. Many improvements to the plant are contemplated and the output is to be largely increased.

A Manchester, Eng., firm writes *The Iron Trade Review*, desiring to be put in communication with manufacturers of steel bars, rounds, for use in automatic screw machining. The sizes in demand at present are from ⅝-inch to 2½-inch diameter; ultimately stock 4 inches in diameter will be wanted. The specifications call for an unusual degree of accuracy in rolling. Bars up to 2 inches could have a total variation of not more than .008 inch, that is .004-inch over or under the specified diameter. Bars from 2 to 2½ inches could have a total variation of not more than .010, that is plus or minus .005; bars over 2½ inches, a maximum of .015, equal to plus or minus .0075.

Fires and Accidents:—

The pattern storage house and repair shop of the American Car Foundry Co., located at Milton, Pa., were burned Oct. 14. The fire was caused by sparks from a passing locomotive. Loss $25,000; fully covered by insurance.

Fire destroyed in part the Knowles' Foundry, at La Salle, Ill., Oct. 17. The loss is between $3,000 and $4,000, fully covered by insurance.

The tap and die works at Millersburg, Pa., burned Oct. 19; loss $15,000.

A cylinder head of one of the blowing engines at the Lorain Steel Co.'s blast furnace blew out Oct. 19, doing considerable damage. The speed was 30 revolutions.

The foundry of C. L. Stuck, Hubbardstown, Mich., has been burned, with a loss of $6,000.

New Construction:—

Childs & Cox, Grand Junction, Ia., will erect new machine shops this fall.

The Buhl Stamping Co., Third and Congress sts., Detroit, Mich., is letting contracts for a new ware house and annealing works, of brick, three stories high, 100x98 feet in size.

The Bolt & Nut Co. of Scranton, Pa., expects to have its new plant in operation by Nov. 15. The buildings are completed and the machinery is being put in place. The mill is a lofty building, 120x160 feet and the factory buildings 60x240. The warehouse is 60x120. The annual output of the plant is estimated at 10,000 tons of bolts, nuts, bar iron, spikes, washers and bridges.

The Sheriff-Gibson Foundry & Machine Co., at North Bridgewater, Pa., is enlarging its capacity and its force of workmen.

The Star Drilling Machine Co., of Akron, O., has commenced work on three additions to its machine shop and foundry departments. They will be 40x60, 50x80 and 30x50 feet. William Greiff, of Cleveland, has been elected president of the new company, H. W. Cole disposing of his interest. The capacity of the plant will be increased about 40 per cent.

The Marion Malleable Iron Co., has begun the erection of three new additions to the works in West Marion, O. One is an addition to the foundry, 75x150 feet, another is an addition to the core room, 40x60 feet, and the third is an addition to the annealing room, 53x60 feet. The enlarged works will give employment to 100 additional men.

Contracts have been let for a 22x72 foot two-story addition to the Jenks & Muir Mfg. Co.'s factory at Detroit, Mich. The firm manufacture brass and iron bedsteads, wire mattresses, etc.

The Pennsylvania Steel Co., of Harrisburg, has secured a contract to erect a steel ore pier 1,000 feet long for the Cuban Steel Ore Co. The pier will be located 30 miles west of Santiago. The contract also calls for railroad bridges necessary in the construction of a road from the company's mines to the new pier.

The American Tool Works Co., of Cincinnati, has about concluded negotiations for a tract of land in Bond Hill that will be used for the erection of a large and modern building.

Work will soon begin on the Webster, Camp & Lane Machine Co.'s machine shop addition at Akron, O. The foundry building will also be connected with the main shop, bringing all departments under one roof.

The Sharon Boiler Co. has secured 5¼ acres of land south of Sharon, Pa., for its new boiler works. The main building will be 100x140 feet and will be of brick and steel. The Penn Bridge Co., of Pittsburg, has the contract.

The Kensington Engine Works Co., of Philadelphia, intends erecting an addition to its works at Beach and Vienna streets. It will be used for a boiler and storage room, and is

to be brick, stone and iron, one story, with cement flooring, slag roofing, electric wiring, etc.

Meadville, Pa., may soon have a malleable iron plant. The committee in charge of the subscription books have about half the required amount in sight.

A new building is being erected by the Greer Machinery Co. Knoxville, Tenn., to take the place of the one burned some months ago.

At Rome, N. Y., the Rome Steel Co.'s new building, 80x144 feet, is being built of wood because of the impossibility of getting steel in time. It will be completed about Dec. 1. An addition will be made in the spring.

A foundry 130x137 feet has been added by the Pierce, Butler & Pierce Mfg. Co., at Eastwood, Syracuse, N. Y., and will be occupied Nov. 1. An additional number of molders will then be employed on boiler and radiator work.

The Berlin Iron Bridge Co., of East Berlin, Conn.; has the contract for erecting at Yonkers, N. Y., a grand stand for the Empire City Trotting Club. It will be a structure 100 feet wide and 400 feet long. Located at some distance above the main seating deck are boxes suspended from roof trusses, adding much to the desirability of the stand, and increases the seating capacity to a great extent. The structure is to be fire-proof throughout. Nothing combustible is to be used. The frame work will be steel. Floors will be brick paving and concrete. The seating deck platform will be cement and concrete. The roof covering is to be corrugated iron. This stand will be one of the largest and best equipped ever built.

Ground has been broken at Terre Haute, Ind., for an iron and wire fencing and ornamental iron works. J. H. Srofe, of Kokomo, is at the head of the enterprise.

The Chester Rolling Mill Co. is pushing work on its new sheet mill at Chester, W. Va. The contract for the mills has been placed with the Lloyd Booth Co., Youngstown, O., and for the engines with the C. G. Cooper Co., Mt. Vernon, O.

The Huber Mfg. Co., Marion, O., is erecting a boiler shop 50x250 feet. It will be equipped with improved machinery for boiler making.

A new blacksmith shop and other additions are being made to the plant of the Adolph Leitelt Iron Co., Grand Rapids, Mich.

The Pittsburg District:—

The Bessemer gas engine and clutch works at Grove City, Pa., will be largely extended in the near future by reason of increasing business.

Patented designs of David Carlin, president, will be followed in equipping the new soil pipe works to be built in Allegheny on the site formerly occupied by the Carlin Mfg. Co. F. J. Torrance, also interested in the patents, will be engaged on this plant. Special economies will be secured by molding on one floor and pouring on another, the sand being returned through chutes. The pipe after being shaken out will be immediately dipped. A single flask under this system will answer for a dozen as ordinarily required.

The rate on pig iron from Alabama to Pittsburg will be advanced Nov. 1 from $4.35 to $4.60, an increase of 25 cents a ton.

The Edgar Thomson Steel Works of the Carnegie Steel Co. last week broke its best previous record by turning out 19,800 tons, or an average per turn of 12 hours of 1,650 tons. On Wednesday night 113 heats were made, against a best previous record of 110 heats. On the succeeding Friday the day turn made 116 heats, breaking the record again.

The American Steel & Wire Co. last week closed down the Braddock plant for repairs, which will take from 10 days to two weeks.

It is stated that the Pittsburg Steel Foundry Co., Pittsburg, which has about completed a steel foundry at Glassport, will erect 100 dwelling houses a short distance from the plant, for the employes.

A Pennsylvania charter was issued last week to the Baker Mfg. Co., Pittsburg, with $10,000 capital stock. The incorporators are Claire G. Tucker, Robert D. Ellwood, Jr., Robert L. James and Chauncey Loblenger. The company will erect a plant on Second ave., Pittsburg, to manufacture certain inventions of Mr. Tucker.

The dissatisfied puddlers are continuing their agitation growing out of the fact that conditions did not call for an advance in their wages at the last bi-monthly settlement. A number held a meeting last Sunday, and a committee was appointed to make arrangements for a mass meeting next Sunday. Charges are made against the officials of the Amalgamated Association, that the puddlers have been discriminated against, but no actual proof of these charges can be presented.

The Pressed Steel Car Co. is about to enter into the manufacture of steel box cars, a move which has been contemplated for some time. The business was confined originally to self-discharging hopper cars. Lately the company made an important addition by taking up in addition the manufacture on a large scale of mine cars. The pattern of steel box car was evolved by Mr. Charles T. Schoen after two years' work. The company has just taken orders aggregating 1,100 steel box cars, from the Chicago, Lake Shore & Eastern and the Western New York and Pennsylvania. The cars will be of 80,000 pounds capacity and cost $1,500 each. Wooden box cars having a carrying capacity of 70,000 pounds cost from $750 to $850 each, and on account of the greater durability, greater carrying capacity, and decreased weight it is figured that the steel cars will be considerably more economical.

The Riter-Conley Co., of Pittsburg, has been awarded the contract to furnish the steel work for the new electric power station at Port Dundas, Scotland. The successful bid was $125,000.

The Keystone Bridge Co., of Pittsburg, is practically rebuilding the converting mills of the Edgar Thomson Steel Works. The converting department and all the ladle repairing and engine houses are being put under one building.

The Wood Run plant of the Pressed Steel Car Co. is to be equipped with electric power at a cost of $100,000.

Laughlin & Co., Ltd., Pittsburg, have secured control of some extensive deposits of limestone and ganister on Canoe Creek, near Altoona, Pa., and will develop the tract.

The Schultz Bridge & Iron Co. have closed a contract for two steel buildings, taking 500 tons of steel, to be put up at Progresso, Yucatan, and to be used for storing hemp.

The Standard Seamless Tube Co. held a meeting Tuesday, Oct. 24 to elect officers. C. E. Pope is president, and H. L. Nicholson treasurer.

The Union Steel Co., whose plans for a steel works and rod mill at Webster, Pa., were announced last week has opened offices on the eleventh floor of the Carnegie Bldg.

Scarcity of puddlers and heaters has limited output in a few local mills the past week.

It is estimated that about 15 miles of wrought iron pipe for South Africa, weighing about 1,000 tons, of a diameter of from 6 to 16 inches, is being held in Pittsburg warehouses, subject to the direction of the English buyers. The buyers some time ago cabled to stop all shipments as the war conditions were such as to render the safe delivery of British goods in the Transvaal or Cape Colony impossible for some time. At the same time the British buyers, who control the gold and diamond fields, cabled the suspension of work on new contracts.

Chicago District and Northwest:—

The Deere & Mansur Co., Moline, Ill., and their molders had a meeting last week to discuss their differences. The company presented a contract which granted most of the requests of the men, but made the minimum rate $2.50, instead of $2.75. The form of contract proposed had the sanction of the National Founders' Association. The molders refused to accept it and final settlement seems some distance off.

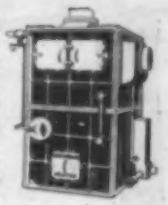
The St. Paul, Minn., union iron molders have struck. The union has a membership of 150, and there are about 40 apprentices. The men want a revised and advanced schedule of wages.

The B. F. Barnes Co., Rockford, Ill., is to be incorporated, with a capital stock of $50,000, to manufacture machine tools. B. F. Barnes, who will be at the head of the company, has been connected with the W. F. & John Barnes Co., of Rockford, for years, and recently retired from that company.

The plant of the La Fayette Bridge Co., La Fayette, Ind., which was totally destroyed by fire Oct. 5, is being rebuilt, and when finished will be much larger and better than it was before the fire. The plant will consist of a main building, 500x50 feet; a blacksmith shop 86x50 feet; a machine shop, 50x50 feet, and an engine building 30x30 feet in size, together

Can You Lift Yourself By Your Boot Straps?

Your live steam injector may be putting water into your boilers at a temperature of 190° F. Do you therefore think that the only saving you could make by increasing the temperature would be the difference between water at 190° and water at 210°, or say 6% of a saving. Not at all? As far as coal saving is concerned, you are actually feeding cold water at the temperature of the initial supply, which may only be 30°, or 40°, or an average of 50° all the year round. A **COCHRANE HEATER** with just enough exhaust steam to do the work (generally one seventh of all the steam the boilers are making) **will save, in the average plant, 16% of all the coal used while that injector was being operated,** regardless of the temperature of the water delivered by the injector.



The heat the injector put into the water came from the boiler. The pull you put on your boot straps comes from within yourself. Think this over—write us, and we will tell you how to apply the force at the proper point that will lift you out of a rut.

HARRISON SAFETY BOILER WORKS, **Clearfield & 17th Sts., PHILADELPHIA PA**

with an office building. All the buildings are to be of frame construction, with slate roofs. The heavy machinery in the plant will not have to be renewed, as it was not damaged by the fire. Some of the lighter machinery will be replaced.

It is reported that the plant and business of the Belle City Malleable & Wrought Iron Co., Racine, Wis., has been sold to a company of Chicago and other capitalists. The blacksmith shop equipment is excepted. This will probably be taken by the Shad Bolt & Iron Co., of Milwaukee.

McDowell, Stocker & Co. have incorporated at Chicago, with capital stock of $60,000, to manufacture machinery. The incorporators are David McDowell, Horace A. Stocker and David H. Roblin.

Iroquois Furnace has blown out for relining, and will resume in the early part of December.

The Q. & C. Co., Chicago, now exclusively controls the sale of Magnolia anti-friction metal to the railroads, both steam and electric, of the United States, Canada and Mexico. This arrangement went into effect Oct. 16.

The Christensen Engineering Co., of Milwaukee, engaged in the manufacture of street car brake equipments, will increase its facilities. New works are to be built immediately, increasing capacity several times.

The E. P. Allis Co., Milwaukee, Wis., will shortly begin the erection of a building, 75x100 feet, as an addition to the National ave. shops, and this will be equipped with the newest, most improved and largest type of machines for the manufacture of pumping and blowing engines; also another shop, 50x100 feet, on Barclay st., as a continuation of the Barclay st. machine shop. In this will be manufactured mining and saw mill machinery. The company has made extensive additions to its works on its own ground, and was obliged to rent buildings in Buffalo, because foundries in Milwaukee and elsewhere, to which it has given excess work, are so crowded with orders of their own that they can no longer help the Allis company out.

The J. G. Wagner Co., Milwaukee, has purchased land 200x346 feet, and will erect a foundry with 30 tons daily capacity. Some extensions will also be made in the structural department.

The plant of the American Steel & Wire Co., at Waukegan, Ill., was shut down for a part of last week on account of inability to get coal. Scarcity of cars rather than of coal is the cause.

General Industrial Notes:—

The Buffalo Iron Co. has started the Mannie No. 2 stack, at Allen's Creek, Tenn., on charcoal fuel. The production of this furnace will be absorbed by orders already booked, and the iron will not be placed on the market for delivery previous to Jan. 1.

The Republic Iron & Steel Co. is extensively improving its Columbia Heights, Minneapolis, plant. A 25-ton open-hearth furnace and an electric charging machine will be added. The steel buildings will be extended 100 feet and the gas house building 50 feet. It is estimated that $65,000 will be expended on improvements.

The Amalgamated Association of Iron and Steel Workers has asked the Cincinnati Chamber of Commerce to use its influence to keep the Riverside tin plate mill at Cincinnati running.

On Thursday of last week at the Pennsylvania Steel Works at Steelton, Pa., the rail mill turned out in 24 hours about 1,000 tons of rails. It was the largest output in the history of the mill.

The Dimmick Pipe Co., which was recently organized in Birmingham, Ala., with a capital of $175,000, will erect its plant at North Birmingham.

Col. H. A. Marting has purchased the Wenona, Buchtel and Greendale blast furnaces in the Hocking Valley, near Logan, O., and will wreck them and make two furnaces of about 100 tons Bessemer capacity. Columbus offers him 15 acres

The Southern Leaders.

PIG IRON.

The extreme depression in pig iron forced several favorite brands out of the market because furnace owners could not pay prices demanded for their choice supply of ore and coke.

The present revival enables them to operate again and it is a pleasure to offer

TALLADECA, TRUSSVILLE, VANDERBILT, WILLIAMSON.

The plants are not large and the combined production will not cut much figure in the year's output. Each one, however, will be run under the close personal care of the owner and the customers will be assured of the highest standard in quality and grading.

Prices no higher than for standard Southern brands. Write for quotations.

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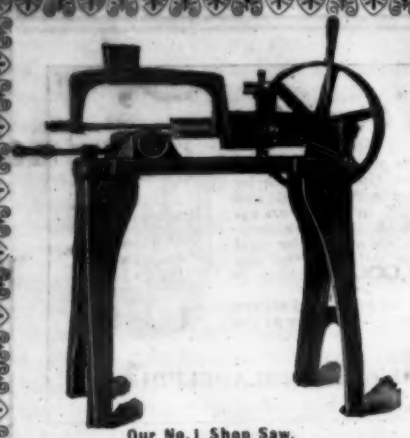

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THE Q AND C

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of ground adjacent to four railroads if he will move the furnaces to that city. Col. Marting is also negotiating for land at Ironton, O., and if he is successful will move the furnaces to that place.

The Stewart Iron Co.'s blast furnace at Sharon, Pa., which went out of blast recently for repairs, will not be put in operation until about the first week in December.

There is a probability that the Kratz Foundry & Machine Works, of Evansille, Ind., will be moved to Owensboro, Ky.

The Lickdale Iron Works, Lickdale, Lebanon Co., Pa., have resumed after improvements which will greatly increase output. The plant has two 3-ton converters and a 4-inch blooming mill.

Charlotte Furnace employes at Scottdale, Pa., have received a 10 per cent increase in wages.

Some of the Sharon (Pa.) Steel Co.'s contracts have been let. Wm. Tod & Co., Youngstown, O., will build two compound blowing engines with 84-inch chambers and cylinders 42x80 inches, and a blooming mill engine. A 36-inch blooming mill with table, shears, etc., complete, has been awarded to the Lloyd, Booth & Co., of Youngstown. Riter-Conley Co., of Pittsburg, has the iron work for blast furnace, and will also build the four stoves and a 225-foot stack. The Shiffler Bridge Co., of Pittsburg, has the contract for the erection of the buildings. J. V. Rose, of Sharon, has orders for fire brick.

The Phoenix Iron Co., Phoenixville, Pa., has just completed three new open-hearth furnaces and has broken ground for a fourth.

A carload of steel cut nails has been shipped from the Valley plant of the Republic Iron & Steel Co., at Youngstown, O., consigned to the United States Government, Manila, Philippine Islands.

The Vulcan Iron Co., Ltd., New Castle, Pa., has been reorganized. The new company will be known as the Vulcan Foundry & Machine Co. The capital stock is increased from $35,000 to $75,000. The plant will be remodeled and considerably improved. The officers of the new company are: President, J. S. Kaufman, Pittsburg; secretary, John M. Watson, New Castle, who was connected with the former company, and treasurer, N. O. Strasburger, of Anderson, Ind.

The Ingersoll-Sergeant Drill Co. has booked an order for 12 air compressors to be shipped to John McDonald & Co., of Glasgow, a leading machinery firm.

Fred. Hoffman and W. H. Weller, formerly of the Hoffman-Billings & Weller Mfg. Co., are forming a company and will purchase the blast furnace at Jenifer, Ala., with abundant ore, coal and limestone lands.

The gas makers at the New Castle plant of the National Steel Co. have been granted an advance in wages of 12 cents a day.

The final shipment of 25,000 steel plates for the Coolgardie Water Supply Co., of Australia, has been made by the Glasgow Iron Co., Pottstown, Pa. They are 28 feet in length, and the weight of the entire 25,000 plates aggregates 35,000 tons. They are to be shipped to Australia flat, with special machinery for curving them upon their arrival. The entire contract was awarded to the Carnegie Steel Co., and about half the plates were rolled in Pottstown.

The W. P. Davis Machine Co., of Rochester, N. Y., is shipping a number of machines to Milan, Italy, which are to be used in government works. The company also has a good trade in Germany, Berlin being the principal point of shipment. It is also shipping to Moscow, and has a fair trade in London, besides several other points in Europe. Its output for the United States is all taken by a few of the leading dealers in the different cities. The W. P. Davis Machine Co. is now making a complete line of lathes from 10-inch to 30-inch swing, any length of bed required, and is having a very large trade on its key-seaters and cutting-off machines.

The options of the Searles syndicate on the steel and structural mills and car works at Duluth and Superior have been

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If you need any soft iron for quick shipment we can supply it. If you was to contract for next year we can make you fair prices for the best brands in the market.

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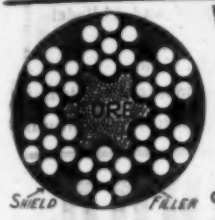

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MALLEABLE

HIGH GRADE CASTINGS. QUICK DELIVERIES.

BUHL MALLEABLE CO., Detroit, Mich.

extended to November. Plans are under way for a new open-hearth furnace to be built by the Superior Steel Co.

The Lake Shore Gas Engine Co. has been organized at Marquette, Mich., with a capital of $100,000, to take over the plant of the Lake Shore Iron Works for the manufacture of gas engines.

The first Ironaton, Ala., furnace of the Alabama Consolidated Coal & Iron Co. to be put in blast is about starting up. The second will be in blast by Jan. 1, 1900. The Gadsden furnace will blow in Nov. 15.

The remodeled West Duluth furnace at Duluth, Minn., has been put in blast by John M. Thomas.

The Oriskany (N. Y.) Malleable Iron Works has increased the wages of molders 10 per cent, of coremakers 5 per cent, and of day men 5 per cent.

The Paducah, Ky., furnace has been sold to a New York syndicate.

The Paterson Iron Works, Paterson, N. J., closed under receivership two years ago, will be opened before Dec. 1, under a new management. George A. Beckwith and James Shields have organized a new corporation and will have the co-operation of Receiver Sherwood and the principal creditors in floating the enterprise.

The Cleveland Ball & Screw Co., Cleveland, manufacturers of steel balls and automatic screw machines, has recently received important contracts and orders, besides correspondence which is expected to lead to considerable business on the larger sizes of tool steel balls. Among others the company has received large orders for 1 inch, 1½ inch, 2-inch and 2½-inch diameter finished tool steel balls, for use in the manufacture of steam shovels, dredging machinery, conveying mechanism, ore and quartz crushers, cement mills, traveling cranes, electric elevators. Orders have been received also for a somewhat smaller size ball, in 10,000 to 100,000 lots for use in agricultural implements, as well as season contracts and general orders for the smaller sizes, such as are used in the manufacture of bicycles, pedals, hangers, hubs, ball-bearing roller skates. Many orders have been

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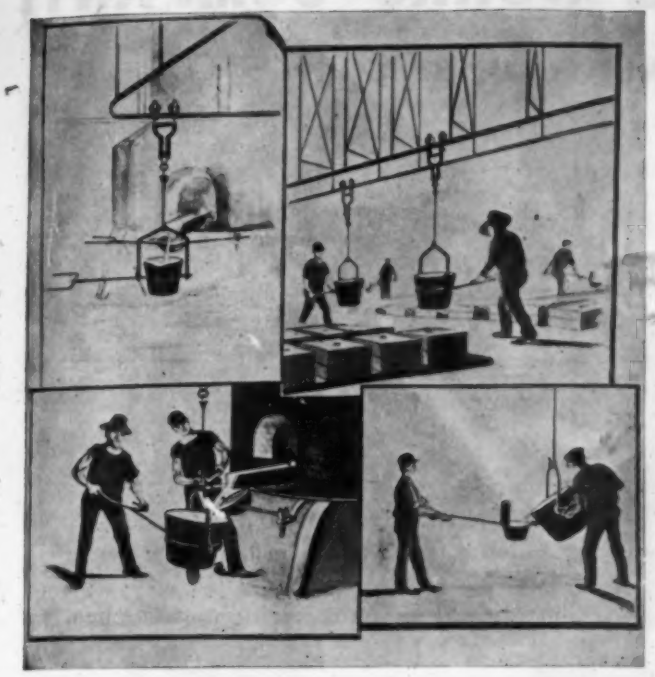
The Auto-Acetylene Co., 13-21 Park Row, New York, which has placed upon the market an acetylene generator has found it necessary owing to the increased demand for this machine in the past year, to enlarge its factory facilities by adding a two-story building 40x90 feet, at Greenpoint ave. and Pavost st., Brooklyn. In addition to the company's business in the United States, the demand for its apparatus in Europe has required manufacturing facilities there, and it has established a factory at Boulogne-Sur-Seine, Paris. The headquarters in Europe are 27 Rue de Richelieu, Paris and reports state that the demand for the apparatus now exceeds the capacity of the factory. The auto-generators are provided with two or more carbide chambers to each generator and a condenser purifier which cools, dries and purifies the gas. The water deal attachment and safety gauge are automatic, and a uniform pressure best suited for the gas is constantly maintained. The whole apparatus is self-contained and requires no attention. When once the proper pressure of gas is determined, the regulator is set for that pressure, and it does not vary. The gasometer is correctly proportioned to the capacity best suited for the average flow of gas. The Auto-Acetylene Co., now furnishes generators of from five to 3,000 light capacity, and is shipping a variety of machines to all parts of the country. Descriptive circulars are sent from the office.

Foundries



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Carnegie Steel Company, Ltd., Edgar Thompson	9	3,500	Six
Carnegie Steel Company, Ltd., Rankin (Carrie)	2	700	Doub'e.
Carnegie Steel Company, Ltd., Pittsburg (Lucy)	2	800	Double.
Struthers Furnace Company, Struthers, O.	1	300	Single.
Laughlin & Co., Ltd., Pittsburg, Pa. (Eliza)	3	2,000	Double (2).
Oliver & Snyder Steel Company, Pittsburg, Pa. (Edith)	1	400	Double.
Oliver & Snyder Steel Company, New Castle, Pa. (Rosena)	1	500	Double.
Shenango Valley Steel Company, New Cast'e, Pa.	2	800	Double.
Bellaire Steel Company, Bellaire, O.	2	700	Double.
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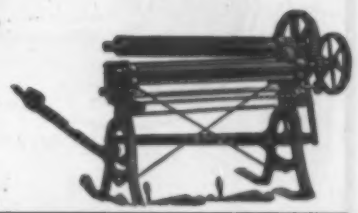

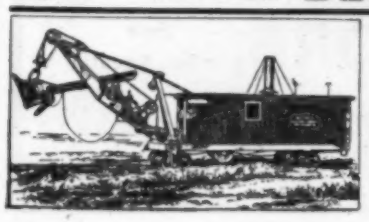

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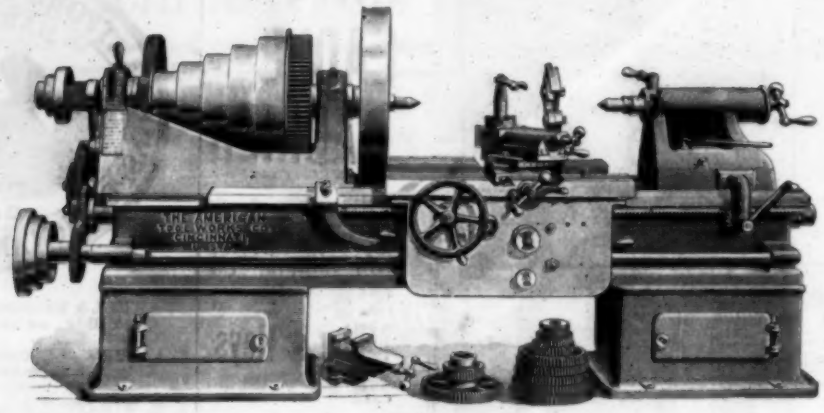

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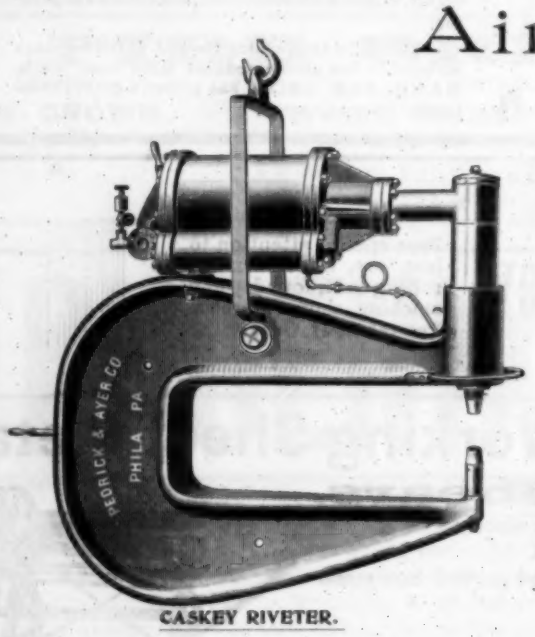

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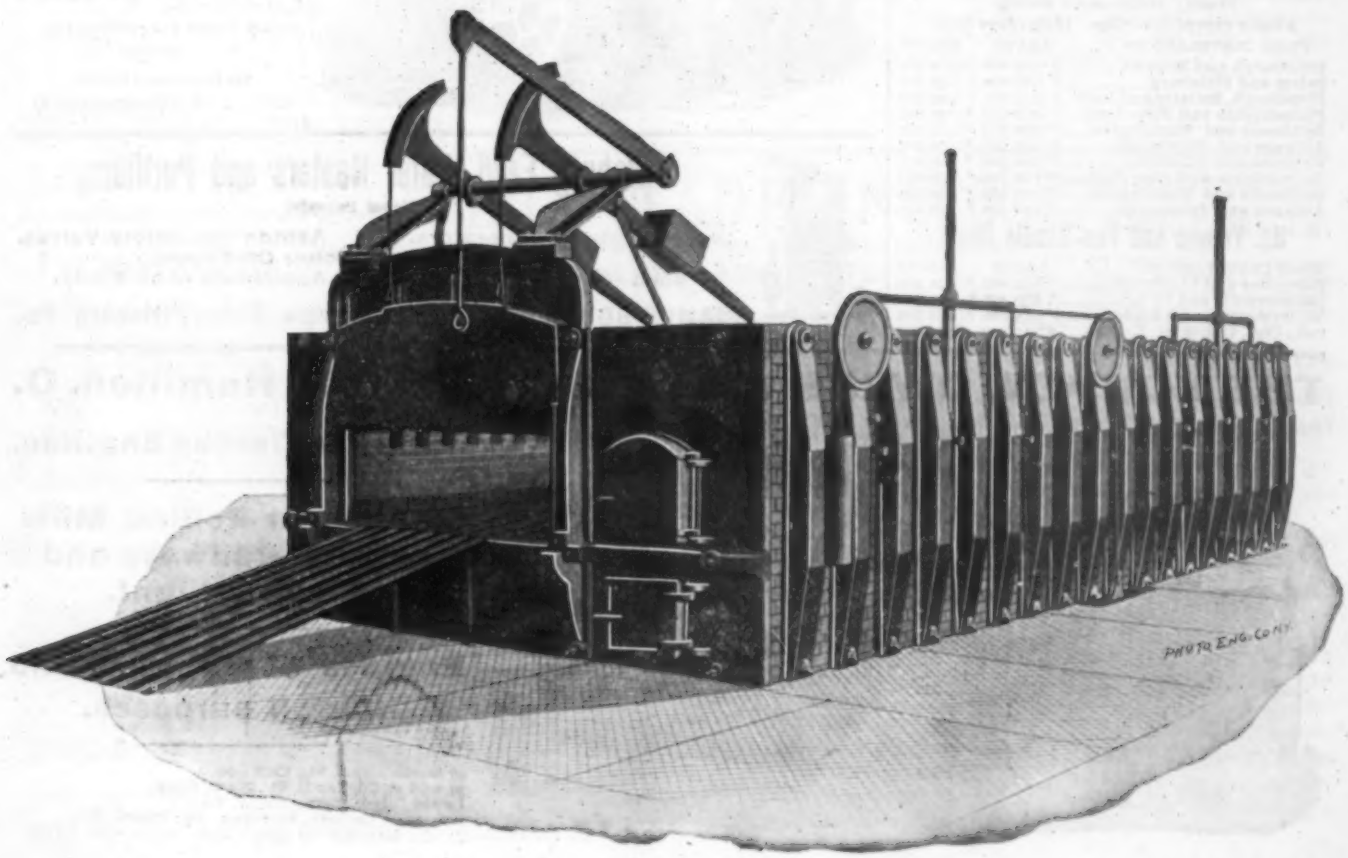

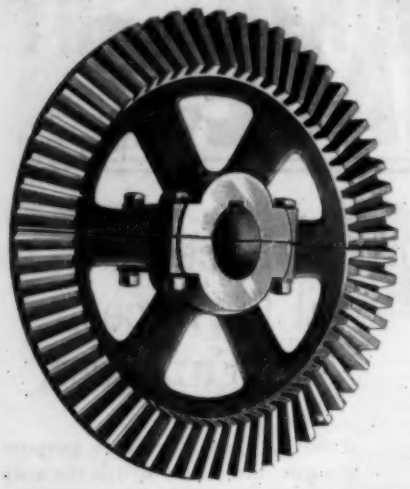

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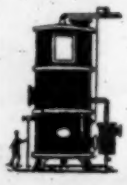

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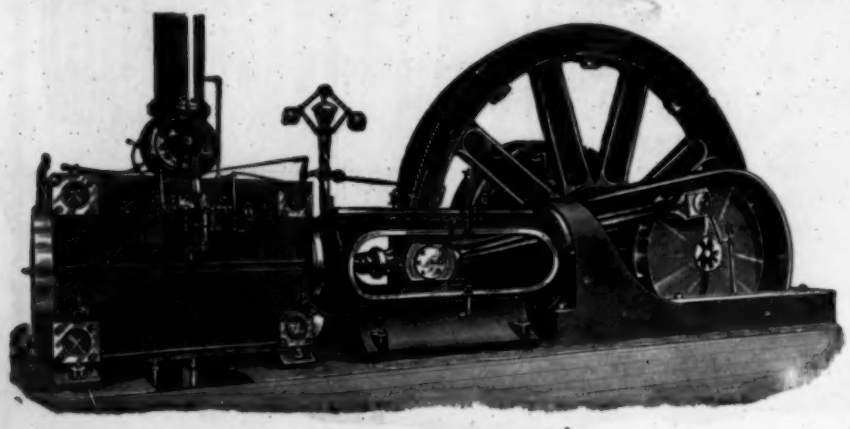

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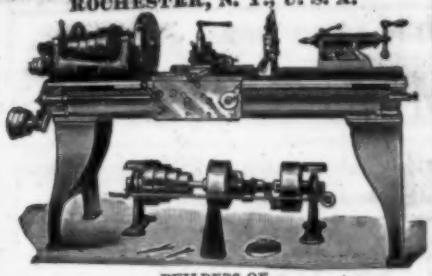

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Akron, Canton & Chicago.....	*8:05 A M	*6:35 P M
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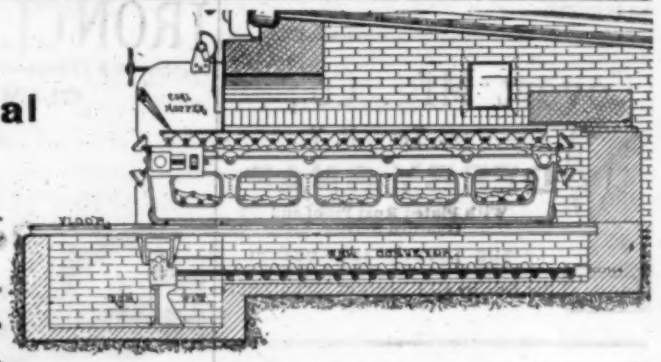

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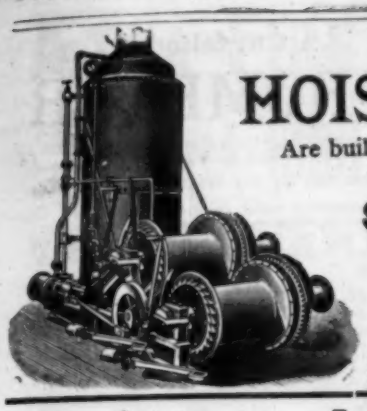

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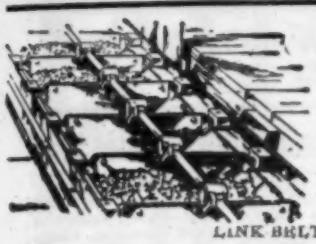

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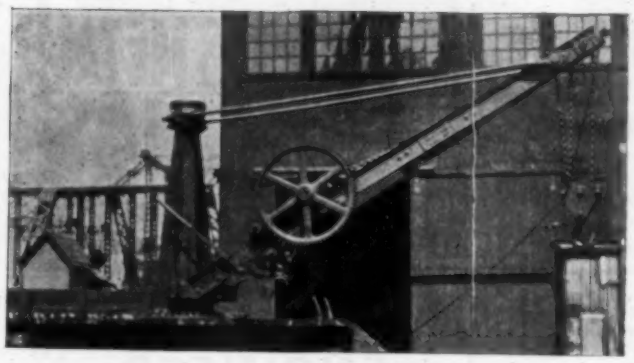

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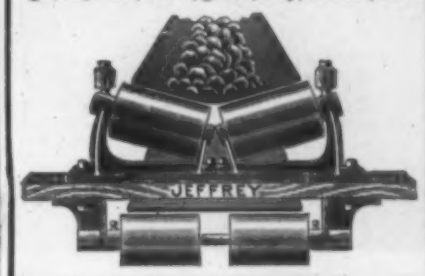

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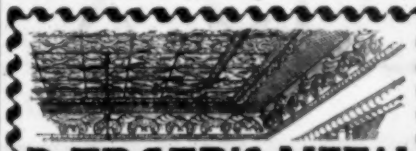

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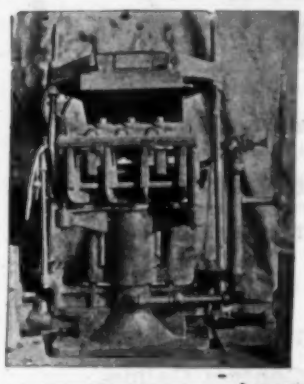

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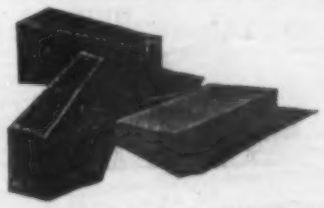

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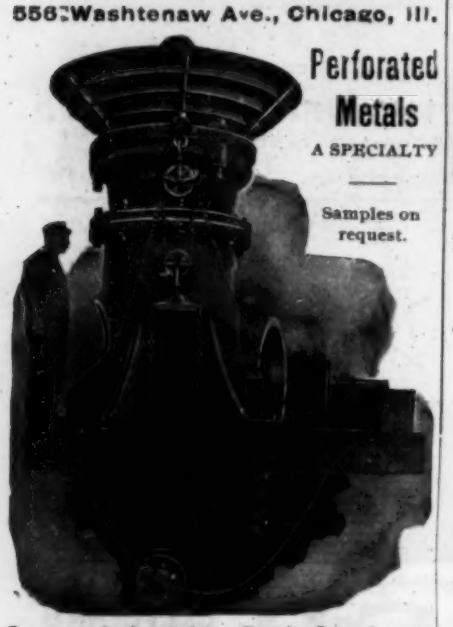

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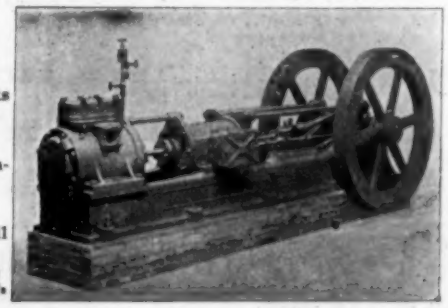

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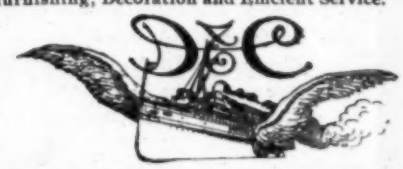

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Eight (8) 10-ton Ingot Cranes,
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Foundryman or Foundry Boss, capable of calculating the burden or burdening 175-ton furnace using an equal mixture of red fossiliferous and brown hematite ore and of handling the labor in and about the furnace proper economically, and maintaining a good output of iron of analysis and grade called for. A capable man can secure a good salary to start on. Must be well recommended. Apply, giving references, care IRON TRADE REVIEW to the following address:

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The Axle Works property No. 694 Broadway at Junction of Broadway, Erie and Cleveland Terminal & Valley railway, Cleveland, O., including engine, boiler and shafting; or will erect on these premises buildings to suit tenant, if leased for a term of years. Address

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An experienced chemist and metallurgist.

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DIRECTORY

To the Iron and Steel Works of the United States for 1898.

PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

Thoroughly Revised. Price, Seven Dollars.

The American Iron and Steel Association has just completed a thorough revision of its Directory to the Iron and Steel Works of the United States, bringing down to April, 1898, a description of these works. It also contains a complete Directory to many leading industries which are large consumers of iron and steel. This edition, which is the fourteenth that has been issued, embraces more complete details of all the iron and steel works of the United States, and of industries which are large consumers of iron and steel, than any preceding edition. It retains all the old features of preceding editions and contains many new features.

In the edition for 1896 there was given for the first time a complete list of Malleable Iron Works in the United States, and to this new feature there are now added complete lists of the Rail Mills, Structural Mills, Steel Casting Works, Bolt, Nut and Rivet Works, Chain Works, Seamless Tube Works, and Riveted Pipe Works—all new features.

The lists of Plate and Sheet Mills and of Tin Plate and Stamping Works are much more complete than in previous editions. The names and location of all the works described are given in alphabetical order, followed by a description of their character, capacity and products, with the names of the principal officers, etc., including the names of selling agents. This edition makes a cloth-bound book of nearly 400 well-printed pages—many more than in any previous edition. It contains a complete list of all the

Blast Furnaces,
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Bessemer Steel Works,
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Rail Mills,
Structural Mills,
Steel Casting Works,
Cut-Nail Works,
Tin Plate Works,
Stamping Works,
Forges and Bloomaries,
Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
Malleable Iron Works,
Cast Iron Pipe Works,
Cast Iron Soil and Plumbers' Pipe Works,
Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
Bolt, Nut and Rivet Works,
Car Axle Works,
Car Wheel Works, and
Car Builders in the United States

ALSO A LIST OF THE

Iron and Steel Works in Canada and Mexico.

This edition of the Directory is an invaluable book of reference for all business men who wish to correspond with iron and steel manufacturers or with iron and steel consumers, forming, in every respect, a COMPLETE GUIDE to the iron and steel works of this country and to the principal works which consume iron and steel.

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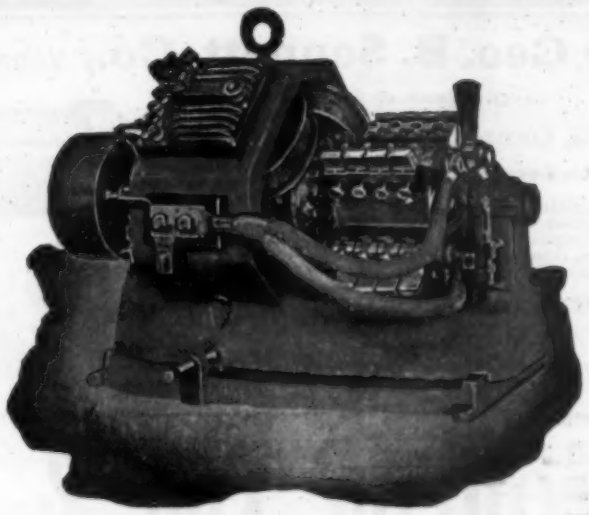

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IRON ORE.

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Special low-phosphorus hard ore, Bessemer	$5.50
No. 1 Specular, Bessemer	$4.25@ 5.00
No. 1 Bessemer, hematite	4.00@ 4 75
Hematites No. 1 non-Bessemer	3.50@ 3.75
No. 1 Specular, non-Bessemer	3.50@ 4.00
Mesabi Bessemer	3.50@ 4.00

PIG IRON.

Cleveland (f. o. b. cars):

Bessemer	$24.00
No 1 Strong Foundry	$23 00@ 23.50
N . 2 Strong Foundry	23.00@ 23.75
Gray Forge, red short	21.35@ 21.75
No. 1 American Scotch	23 00@ 23.50
No. 2 American Scotch	22.25@ 22.75
Lake Superior Charcoal	25.00@ 29.00

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$30.00
Old steel rails (6 ft. and over)	21.00
Old steel rails (6 ft. and under)	23.00
Old car wheels	19.00
	Net Tons.
No. 1 R. R. wrought scrap	$22.00
Mill scrap	17 00
No. 1 Machine cast scrap	16.00
Iron axles	17 00
Axle turnings	16.00
Wrought turnings (free from cast)	13.00
Cast borings	11.00
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Sheet iron	10.00
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Beams and channels (f. o. b. Cleveland)	2.35c
Angles	2.35@ 2.45c
Tees	2.45c
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Sheared plates	3.00c

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[Less than car-lots, Cleveland.]

Rounds and Squares—Bar Iron.

1 to 1⅝	2.50 Base.
2 to 2⅝	.20 extra.
3 to 3½	.50 "
3⅝ to 4	.80 "
4⅛ to 4⅝	1.00 "
4⅞ to 5	1.30 "
5⅛ to 6	1.80 "
6⅛ to 6⅝	2.20 "
6⅞ to 7⅛	2.50 "
⅛ to ⅜	.10 "
⅞ to 11-16	.20 "
⅝ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13-32	.50 "
5-16 to 1-32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1⅛ to 4 x ⅜ to 1	1.05 Base
4⅛ to 6 x ⅜ to 1	.10 extra
6⅛ to 8 x ⅜ to 1	.60 "
8⅛ to 10 x ⅜ to 1	.80 "
1⅜ to 4 x 1 1-16 to 1⅝	.30 "
4⅛ to 6 x 1 1-16 to 1⅝	.40 "
6⅛ to 8 x 1 1-16 to 1⅝	.60 "
8⅛ to 10 x 1 1-16 to 1⅝	.90 "
2 to 4 x 1⅝ to 2	.50 "
4⅛ to 6 x 1⅝ to 2	.60 "
6⅛ to 8 x 1⅝ to 2	.80 "
8⅛ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4⅛ to 6 x 2⅛ to 3	.80 "
6⅛ to 8 x 2⅛ to 3	1.00 "
1⅜ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.20 "
⅛ to 15-16 x ⅜ to ⅞	.40 "
⅞ to 11-16 x ⅜ to ⅞	.50 "
⅛ to 9-16 x ⅜ to ⅞	.90 "

Heavy Band Iron.

7 to 10 x ⅛ to 5-16	.70 extra.
6⅛ to 6⅝ x ⅛ to 5-16	.50 "
4⅛ to 6 x ⅛ to 5-16	.30 "
1⅛ to 4 x ⅛ to 5-16	.20 "
1 to 1⅜ x ⅛ to 5-16	.30 "
⅛ to 15-16 x ⅛ to 5-16	.50 "
⅞ to 11-16 x ⅛ to 5-16	.80 "
⅛ to 9-16 x ⅛ to 5-16	1.00 "
⅜ to 7-16 x ⅛ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ⅛ to 5-16 thick. Bevel Edge Shaft Iron 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6⅛ to 6⅝ x No. 9 to 3-16	.70 "
6⅛ to 6⅝ x Nos. 10, 11 and 12	.80 "
4⅛ to 6 x No. 9 to 3-16	.50 "
4⅛ to 6 x Nos. 10, 11 and 12	.60 "
1⅛ to 4 x No. 9 to 3-16	.40 "
1⅛ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10

7-16 to ½ x No. 9 to 3-16	1.30 extra
7-16 to ½ x Nos. 10, 11 and 12	1.40
⅝ x No. 9 to 3-16	1.50
⅝ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Band Iron, 1-10 c. above same sizes of Light Bands.

Oval Iron.

⅜ to 1⅛	.40 extra
½ to 13-16	.50 "
⅝ to 11-16	.60 "
¾ to 9-16	.80 "
⅞ to 7-16	1.10 "
¾ to 9-16 x 3-16	1.00 "
⅝ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅜ to 2	.50 "
½ to 13-16	.70 "
⅝ to 11-16	.90 "
¾ to 9-16	1.20 "
⅞ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

Width in Inches.	English Standard Gauge.		Extras.
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16"	1.50	Base.
1¼ to 6,	" 10, 11, 12 or ¼"	.05	per 100 lbs
1 to 1¾,	" 7, 8, 9 or 3-16"	.10	"
1 to 1¾,	" 10, 11, 12 or ¼"	.15	"
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20	"
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25	"
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30	"
11-16 and ¾,	" 10, 11, 12 or ¼"	.35	"
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40	"
9-16 and ⅝,	" 10, 11, 12 or ¼"	.45	"
½,	Nos. 7, 8, 9 or 3-16"	.55	"
½,	" 10, 11, 12 or ¼"	.60	"
7-16	" 7, 8, 9 or 3-16"	.75	"
7-19	" 10, 11, 12 or ¼"	.85	"
⅜,	" 7, 8, 9 or 3-16"	.95	"
⅜,	" 10, 11, 12 or ¼"	1.05	"

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.		Extras.
7-16 to 3	Nos. 13, 14, 15 and 16	1.60	Base
7-16 to 2,	" 17, 18, and 19	.05	per 100 lbs
7-16 to 2,	" 20	.10	"
7-16 to 2,	" 21	.15	"
7-16 to 1¾,	" 22	.25	"
¼ to 1¾,	" 13, 14 and 15	.05	"
1¾ to 1¾,	" 19 and 20	per 100 lbs	
1¾ to 1¾,	" 21	.20	"
1¾ to 1¾,	" 22	.30	"
15-16 and 1,	" 13, 14 and 15		"
15-16 and 1,	" 16, 17 and 18	.15	"
15-16 and 1,	" 19 and 20	.20	"
15-16 and 1,	" 21	.25	"
15-16 and 1,	" 22	.35	"
⅞,	Nos. 13, 14 and 15	.20	"
⅞,	" 16, 17 and 18	.25	"
⅞,	" 19 and 20	.30	"
⅞,	" 21	.35	"
⅞,	" 22	.45	"
¾ and 13-16	Nos. 13, 14 and 15	.30	"
¾ and 13-16	" 16, 17 and 18	.35	"
¾ and 13-16	" 19 and 20	.40	"
¾ and 13-16	" 21	.45	"
¾ and 13-16	" 22	.50	"
¾ and 13-16	" 23	.60	"
11-16,	Nos. 13, 14 and 15	.35	"
11-16,	" 16, 17 and 18	.40	"
11-16,	" 19 and 20	.50	"
11-16,	" 21	.60	"
11-16,	" 22	.70	"
11-16,	" 23	.80	"
⅝,	Nos. 13, 14 and 15	.40	"
⅝,	" 16, 17 and 18	.45	"
⅝,	" 19 and 20	.55	"
⅝,	" 21	.65	"
⅝,	" 22	.75	"
⅝,	" 23	.85	"
9-16,	" 13, 14 and 15	.45	"
9-16,	" 16, 17 and 18	.50	"
9-16,	" 19 and 20	.60	"
9-16,	" 21	.70	"
9-16,	" 22	.80	"
9-16,	" 23	.90	"
½,	" 13, 14 and 15	.55	"
½,	" 16, 17 and 18	.60	"
½,	" 19 and 20	.70	"
½,	" 21	.80	"
½,	" 22	.90	"
½,	" 23	1.00	"
7-16,	" 13, 14 and 15	.80	"
7-16,	" 16, 17 and 18	.90	"
7-16,	" 19 and 20	1.00	"
⅜,	" 13, 14 and 15	1.00	"
⅜,	" 16, 17 and 18	1.10	"
⅜,	" 19 and 20	1.20	"

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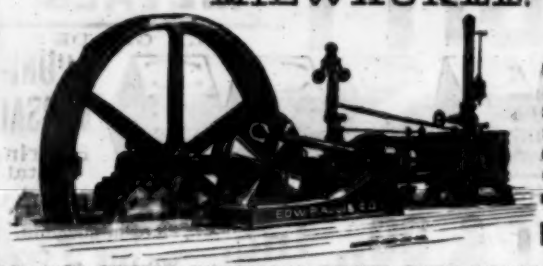

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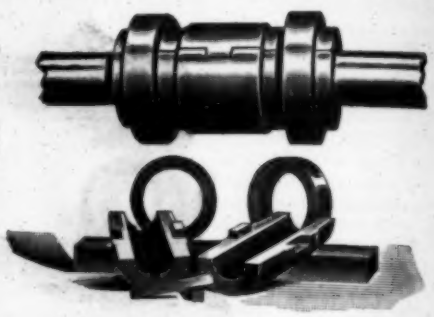

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Foundry contracts solicited for duplicate castings, from 10 lbs. to 5 tons each.

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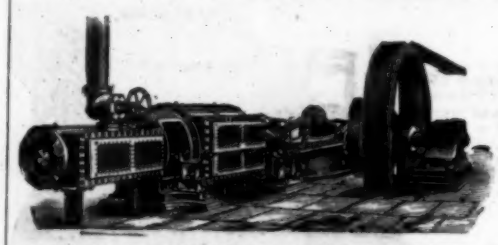

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Lorain Foundry Co., Lorain, O.
J. J. Ryan & Co., Chicago, Ill.

BALLS—
Cleveland Ball & Screw Co., Cleveland, O.

BAR IRON AND STEEL—
Monongahela Iron & Steel Co., Pittsburg, Pa.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Bourne-Fuller Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ills.
American Steel Hoop Co., Pittsburg, Pa.

BEARING METAL—
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
F. R. Phillips Sons' Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago, Ill.

BELTING—
C. H. Besly & Co., Chicago, Ill.
The Chicago Rawhide Mfg. Co., Chicago, Ill.
The Gandy Belting Co., Baltimore Md.
Main Belting Co., Philadelphia, Pa.

BELT CONVEYORS—
Robins Conveying Belt Co., New York City.

BELT LACING—
The Bristol Co., Waterbury, Conn.

BLACKSMITH AND CARRIAGE SUPPLIES—
C. H. Besly & Co., Chicago, Ill.

BLAST FURNACE MACHINERY—
Excelsior Iron Works Co., Cleveland, O.

BLAST FURNACE WORK—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.
The Wm. B. Pollock Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia, Pa.

BLOWING ENGINES—
Southwark Foundry & Machine Co., Philadelphia, Pa.
Edward P. Allis Co., Milwaukee, Wis.

BOILERS AND BOILER ATTACHMENTS—
The Wm. B. Pollock Co., Youngstown, O.
Cahall Sales Department, Pittsburg, Pa.
Enterprise Boiler Co., Youngstown, O.
The Edward P. Allis Co., Milwaukee, Wis.
Hooven, Owens & Rentschler Co., Hamilton, O.
Harrison Safety Boiler Works, Philadelphia.
Meehan Boiler & ConstructionCo., Lowellville, O
Wm. Cramp & Sons, Philadelphia, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
Excelsior Iron Works Co., Cleveland, O.
James Bonar & Co., Pittsburgh, Pa.
W. P. Davis Machine Co., Rochester, N. Y.

BOILER CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

BOILER COVERING—
C. H. Besly & Co,, Chicago, Ill.

BOILER COMPOUNDS—
The Ironsides Company, Columbus, O.

BOILER FRONTS AND FITTINGS—
Playford Stoker Co., Cleveland, O.

BOILER TUBES—
S. Fix Sons, Cleveland, O.
National Tube Co., Pittsburg, Pa.
Shelby Steel Tube Co., Cleveland, O.,

BOILER TUBE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa

BOLTS AND NUTS—
Upson Nut Co. Cleveland, O.

I. & E. Greenwald Co., Cincinnati, O.
Webster Camp & Lane Machine Co., Akron, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
Baush & Harris Machine Tool Co., Springfield, Mass.
Bickford Drill and Tool Co., Cincinnati, O.

BRASS CASTINGS—
J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co., Lorain, O.

BRIDGES—
Shiffler Bridge Co., Pittsburg.

BUILDINGS (STEEL FRAME)—
Shiffler Bridge Co., Pittsburg.
Riter-Conley Mfg. Co., Pittsburg, Pa.

BUCKETS AND DERRICKS—
Excelsior Iron Works Co., Cleveland, O.

CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

CAR UNLOADERS—
Excelsior Iron Works Co., Cleveland, O.

CARRYING TONGS—
Vulcan Mfg. Co., Pittsburg, Pa.

CASTINGS—
Seaman-Sleeth Co., Pittsburg, Pa.
Hooven, Owens & Rentschler Co., Hamilton, O.
Macbeth & Co., Cleveland, O.
W. A. Jones Foundry Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
Riverside Foundry Co., Cleveland, O.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Lorain Foundry Co., Lorain, O.
Bethlehem Steel Co., South Bethlehem, Pa.

CASTINGS (ALUMINUM)
J. J. Ryan & Co., Chicago, Ill.

CASTINGS (BRASS)—
J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co Lorain, O.

CASTINGS (BRONZE)—
J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co., Lorain, O.

CASTINGS (MALLEABLE)—
Acme Malleable Iron Works, Buffalo, N. Y.
Buhl Malleable Co., Detroit, Mich.

CEMENT—
The Brier Hill Iron & Coal Co., Youngstown, O.
Garden City Sand Co., Chicago, Ill.
Reed F. Blair & Co., Pittsburg, Pa.

CHAIN HOISTS—
Reading Crane & Hoist Works, Reading, Pa.

CHAIN BELTING—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
Buhl Malleable Co., Detroit, Mich.

CHANNELERS—
The Ingersoll-Sergeant Drill Co., New York.

CHEMISTS—
F. A. Emmerton, Cleveland, O.
O. Textor, Cleveland, O.
The R. W. Hunt & Co., Chicago, Ill.
John T. Jones & Co., Chicago, Ill.
Cremer & Bicknell, Cleveland, O.
We Fu Go Co., Cincinnati, O.

CHILLED AND SAND ROLLS—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
Riverside Foundry Co., Cleveland, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
F. R. Phillips Sons' Co., Philadelphia, Pa.
Lorain Foundry Co., Lorain, O.

CHUCKS—
Skinner Chuck Co., New Britain, Conn.

COAL CUTTERS—
The Ingersoll-Sergeant Drill Co., New York.
Jeffrey Mfg. Co., Columbus, O.

COAL SCREENS—
Rob't. Aitchinson Per. Metal Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

COAL AND COKE—
Matthew Addy & Co., Cincinnati, O.
Rogers, Brown & Co., Cincinnati, O
Reed F. Blair & Co., Pittsburg, Pa.
Forster, Waterbury & Co., Chicago, Ill.
H. C. Frick Coke Co., Pittsburg, Pa.
McKeefrey & Co., Leetonia, O.
Washington Coal and Coke Co., Pittsburg, Pa.
Pickands, Mather & Co., Cleveland, O.

COAL HANDLING MACHINERY—
Robins Conveying Belt Co., New York City.

COAL MINING MACHINERY—
Jeffrey Mfg. Co., Columbus, O.
Webster Camp & Lane Machine Co., Akron, O.

CONVEYORS—
Jeffrey Mfg. Co., Columbus, O.
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster Camp & Lane Machine Co., Akron, O.
Robins Conveying Belt Co., New York City.

COMPAROMETERS—
Vulcan Mfg. Co., Pittsburg, Pa.

COMPRESSED AIR SHOP TOOLS—
Clayton Air Compressor Works, New York City.
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.
Q & C Co., Chicago, Ill.
American Pneumatic Tool Co., New York City.
Manning, Maxwell & Moore, New York City.

COMPRESSION COUPLINGS—
The Aultman Co., Canton, O.
Geo. B. Sennett Co., Youngstown, Ohio.

CONTRACTORS FOR CLEANING BOILERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

CORE OVENS—
Millett Core Oven Co., Brightwood, Mass.

CORRUGATED IRON—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Cincinnati Corrugating Co., Piqua, O.

COTTON TIES—
American Steel Hoop Co., Pittsburg, Pa.

CRANES AND DERRICKS—
Northern Engineering Works, Detroit, Mich.
Wm. Tod & Co., Youngstown, O.
Marion Steam Shovel Co., Marion, O.
Reading Crane & Hoist Works, Reading, Pa.
The Bucyrus Co., South Milwaukee, Wis.
Brown Hoisting and Conveying Machine Co. Cleveland, Ohio.
Excelsior Iron Works Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.
Cleveland Crane & Car Co., Cleveland, O.

CUPOLAS—
Riter-Conley Mfg. Co., Pittsburg, Pa.
Northern Engineering Works, Detroit, Mich.

DIES—
Danielson Machine & Tool Co., Cleveland, O.

DREDGES—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

DRILL GRINDERS—
J. Wendell Cole Columbus, O.

DRILL PRESSES—
American Tool Works Co., Cincinnati, O.
W. P. Davis Machine Co., Rochester, N. Y.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Baush & Harris Machine Tool Co., Springfield Mass.
Manning, Maxwell & Moore, New York City.
Danielson Machine & Tool Co., Cleveland, O.

DROP FORGINGS—
Wyman & Gordon, Worcester, Mass.
Chicago Drop Forge & Foundry Co., Kensington, Ill.

DROP PRESSES—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
E. Konigslow & Bro., Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.

DROP HAMMERS—
Baush & Harris Machine Tool Co., Springfield, Mass.

DYNAMOS—
Jeffrey Mfg. Co., Columbus, O.

EAVE TROUGHS AND CONDUCTORS—
Berger Mfg. Co., Canton, O.

ELEVATING AND CONVEYING MACHINERY—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster Camp & Lane Machine Co., Akron, O.
Buhl Malleable Co., Detroit, Mich.
Robins Conveying Belt Co., New York City.
Excelsior Iron Works Co., Cleveland, O.

EMERY AND CORUNDUM WHEELS—
Star Corundum Wheel Co., Detroit, Mich.
C. H. Besley & Co., Chicago, Ill.
J. Wendell Cole, Columbus and Chicago.
Northampton Emery Wheel Co., Chicago, Ill.
W. P. Davis Machine Co., Rochester, N. Y.

EMERY WHEEL MACHINERY—
J Wendell Cole, M.E., Columbus, O., or Chicago
Star Corundum Wheel Co., Detroit, Mich.
C. H. Besly & Co., Chicago, Ill.
Northampton Emery Wheel Co., Chicago, Ill.
W. P. Davis Machine Co., Rochester, N. Y.

ENGINEERS AND CONTRACTORS—
Wellman-Seaver Engineering Co., Cleveland, O.
Walter Kennedy, Pittsburg, Pa.
Heyl & Patterson, Pittsburg, Pa.
Meehan Boiler & Construction Co., Lowellville, O
S. K. Erickson, Pittsburg, Pa.
John T. Jones & Co., Chicago, Ill.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Alex Laughlin & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
James Bonar & Co., Pittsburg, Pa.

ENGINE PACKING—
Jenkins Bros., New York City.
C. H. Besly & Co., Chicago, Ill.

ENGINEERS' SUPPLIES—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

ENGINE LATHES—
U. Baird Machinery Co., Pittsburg, Pa.
American Tool Works Co., Cincinnati, O.

ENGINES (OIL)—
The Aultman Co., Canton, O.

ENGINES (STEAM)—
W. P. Davis Machine Co., Rochester, N. Y
Wm. Tod & Co., Youngstown, O.
The Edward P. Allis Co., Milwaukee, Wis.
The Hooven, Owens & Rentschler Co., Hamilton, O.
The Aultman Co., Canton, O.
Geo. B. Sennett Co., Youngstown, Ohio.

GEARING—
I. & E. Greenwald Co., Cincinnati, O.
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.

Fraser & Chalmers, Chicago, Ill.
Southwark Foundry & Machine Co., Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.

ENGRAVERS AND ELECTROTYPERS—
Central Electrotype & Engraving Co., Cleveland, O.
National Engraving Co., Cleveland, O.,
Samuel R. Mason, Cleveland, O.

FEED WATER HEATERS AND PURIFIERS—
Harrison Safety Boiler Works, Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
Austin Separator Co., Detroit, Mich.

FILES, MAKERS OF—
C. H. Besly & Co., Chicago, Ill,

FIRE BRICK AND CLAY—
J. V. Rose, Sharon, Pa.
Union Mining Co., Mt. Savage, Md.
Clearfield Fire Brick Co., Clearfield, Pa.
Dover Fire Brick Co., Cleveland, O.
F. B. Stevens, Detroit, Mich.
Chicago Fire Clay Product Co., Chicago, Ill.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Detroit Mich.
Garden City Sand Co., Chicago, Ill
A. F. Smith & Co., New Brighton, Pa.
Chas Taylor's Sons Co. Cincinnati, O.

FIRE PROOF COVERING—
C H. Besly & Co., Chicago, Ill.

FLEXIBLE SHAFTS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

FLUE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

FOOT AND POWER LATHES—
U. Baird Machinery Co., Pittsburg, Pa.

FORGINGS—
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Cleveland City Forge & Iron Co., Cleveland, O.
Bethlehem Steel Co., South Bethlehem, Pa.
Bræburn Steel Co., Braeburn, Pa.
Wyman & Gordon, Worchester, Mass.
Danielson Machine & Tool Co., Cleveland, O.

FOUNDRIES—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
Hooven, Owens & Rentschler Co., Hamilton, O.
W. A. Jones Foundry Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
Riverside Foundry Co., Cleveland, O.
I. & E. Greenwald Co., Cincinnati, O
Wheeling Mold & Foundry Co., Wheeling, W.Va.
Excelsior Iron Works Co., Cleveland, O.
Macbeth & Co., Cleveland, O.

FOUNDRY EQUIPMENT.
Miller & Hays, Akron, O.
Tabor Mfg. Co., Elizabeth, N. J.
Millett Core Oven Co., Brightwood, Mass.
Brass Founders Supply Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.
Northern Engineering Works, Detroit, Mich.
Cleveland Crane & Car Co., Cleveland, O.

FOUNDRY FACINGS—
Cleveland Facing Mill Co., Cleveland, O.

FOUNDRY SUPPLIES—
Northern Engineering Works, Detroit, Mich.
Chas. Taylor's Sons Co., Cincinnati, O.
Miller & Hays, Akron, O.
Clearfield Fire Brick Co., Clearfield, Pa.
Cleveland Crane & Car Co., Cleveland, O.
The Ohio Sand Co., Conneaut, O.
Union Mining Co., Mt. Savage, Md.
Dover Fire-Brick Co., Cleveland, O
A. F. Smith & Co., New Brighton, Pa.
Tabor Mfg. Co., Elizabeth, N. J.
F. B. Stevens, Detroit, Mich.
Millett Core Oven Co., Brightwood, Mass.
Cleveland Facing Mill Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.
Chicago Fire Clay Product Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth, O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
J. V. Rose, Sharon, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.

FRICTION METAL—
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
F. R. Phillips' Sons Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago, Ill.

FURNACES—
Playford Stoker Co., Cleveland, O.

FURNACE LININGS—
Union Mining Co., Mt. Savage, Md.

FUEL OIL BURNERS—
W. S. Rockwell & Co., New York City.

GALVANIZED IRON—
Apollo Iron & Steel Co., Pittsburg, Pa.

GALVANIZERS—
Ætna-Standard Iron & Steel Co., Bridgeport, O
Apollo Iron & Steel Co., Pittsburg, Pa.

GALVANIZING POTS—
The Wm. B. Pollock Co., Youngstown, O.

GAS ENGINES—
Northern Engineering Works, Detroit, Mich.

GAUGE COCKS—
James Bonar & Co., Pittsburg, Pa.

GEAR CUTTING—
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.

GEAR LUBRICANTS—
The Ironsides Company, Columbus, O.

GREASE—
A. F. Boettcher, Rowlands, Pa.

GRINDSTONES—
C. H. Besly & Co., Chicago, Ill.

GRAPHITE PAINT—
Jos Dixon Crucible Co., Jersey City, N. J.

GRATE BARS—
Geo. B. Sennett Co., Youngstown, Ohio.

GRAY IRON CASTINGS—
W. A. Jones Foundry Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.

HACK SAWS—
Millers Falls Co., New York City.
Q & C Co., Chicago, Ill.

HANGERS—
R. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.
I. & E. Greenwald Co., Cincinnati, O.

HARNESS SNAPS—
Covert Mfg. Co., West Troy, N. Y.

HOISTS—
Reading Crane & Hoist Works, Reading, Pa.
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.

HEATERS AND PURIFIERS—
Harrison Safety Boiler Works, Philadelphia.
James Bonar & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
Austin Separator Co., Detroit, Mich.

HEAVY HARDWARE—
C. H. Besly & Co, Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

HOISTING ENGINES—
The Edward P. Allis Co., Milwaukee, Wis.
Lidgerwood Mfg. Co New York City.
The Aultman Co., Canton, O.
Webster, Camp & Lane Machine Co., Akron, O.
Excelsior Iron Works Co., Cleveland, O

HOISTING MACHINERY—
Link-Belt Machinery Co., Chicago, Ill.
Reading Crane & Hoist Works, Reading, Pa.
Jeffrey Mfg. Co., Columbus, O.
Excelsior Iron Works Co., Cleveland, O.
Lidgerwood Mfg. Co., New York City.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster, Camp & Lane Machine Co., Akron, O.
Robins Conveying Belt Co., New York City.

HORSE SHOES—
Phoenix Horse Shoe Co., Joliet, Ill.

HOTELS—
United States Hotel Co., Cleveland, O.

IMPULSE CLEANERS—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

INDUSTRIAL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

INGOT MOLDS—
Lorain Foundry Co., Lorain, O.

INJECTORS—
C. H. Besly & Co., Chicago, Ill.
Manning, Maxwell & Moore, New York City.
James Bonar & Co., Pittsburg, Pa.

INSURANCE COMPANIES—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

IRON BUILDINGS—
Shiffler Bridge Co., Pittsburg, Pa.
Riter-Conley Co., Pittsburg, Pa.

IRON NAILS AND STEEL—
Bethlehem Steel Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.
H. H. Stroud & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

IRON AND STEEL ROOFING—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport O.

IRON ORE—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Ogiebay, Norton & Co., Cleveland, O.
M. A. Hanna & Co. Cleveland, O.
Drake Bartow & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.

IRON WORKING TOOLS—
American Tool Works Co., Cincinnati, O.
H. Bickford, Lakeport, N. H
C. H. Besly & Co. Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Armstrong Bros. Tool Co., Chicago, Ill.
The Armstrong Mfg. Co., Bridgeport, Conn.
Bickford Drill & Tool Co., Cincinnati, O.
Skinner Chuck Co., New Britain, Conn.
Baush & Harris Machine Tool Co., Springfield, Mass.
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.
Cleveland Ball & Screw Co., Cleveland, O.
W. P. Davis Machine Co., Rochester, N. Y.

LINK BELTING—
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.

LADLES—
Northern Engineering Works, Detroit, Mich.

LATHES—
W. P. Davis Machine Co., Rochester, N. Y.
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.
Manning Maxwell & Moore, New York City.
American Too Works Co., Cincinnati, O.

LUBRICATORS—
A. F. Boettcher, Rowlands, Pa.

MACHINISTS' TOOLS AND SUPPLIES—
American Tool Works Co., Cincinnati, O.
W. P. Davis Machine Co., Rochester, N. Y.
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Armstrong Bros. Tool Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Parkhurst & Wilkinson Co., Chicago, Ill.
Skinner Chuck Co., New Britain, Conn.
Baush & Harris Machine Tool Co., Springfield Mass.
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.

MACHINE SCREWS—
C. H. Besly & Co., Chicago, Ill.

MACHINE SHOPS—
The R. D. Nuttall Co., Allegheny, Pa.
H. A. Streeter, Chicago, Ill.
Danielson Machine & Tool Co., Cleveland, O.

MACHINERY AND TOOL STEEL—
C. H. Besley & Co., Chicago, Ill.
Bræburn Steel Co., Braeburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa
Byron H. White, Chicago, Ill.
Morris & Bailey Steel Co., Pittsburg, Pa.

MAGNESIA COVERING—
C. H. Besly & Co., Chicago, Ill.

MALLEABLE CASTINGS—
Acme Malleable Iron Works, Buffalo, N. Y.
Buhl Malleable Co., Detroit, Mich.

MANUFACTURING CHEMISTS—
We Fu Go Co., Cincinnati, O.

MANUFACTURED IRON AND STEEL—
Bourne-Fuller & Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Parkhurst & Wilkinson Co., Chicago, Ill.
Ohio Steel Co., Youngstown, O
Republic Iron & Steel Co., Chicago Ill.
Monongahela Iron & Steel Co., Pittsburg, Pa.

METAL BEARINGS—
C. H. Besly & Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Merchant & Co., Inc., Philadelphia, Pa.
Swarts Metal Refining Co., Chicago, Ills
F. R. Phillips' Sons Co., Philadelphia, Pa.
J. J. Ryan & Co., Chicago, Ill.

METAL CEILINGS—
Berger Manufacturing Co., Canton, O.

MILLING MACHINES—
American Tool Works Co., Cincinnati, O.
W. P. Davis Machine Co., Rochester, N. Y.
U. Baird Machinery Co., Pittsburg, Pa
Danielson Machine & Tool Co., Cleveland, O.
Manning, Maxwell & Moore, New York City.

MINING MACHINERY—
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis,
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co, New York City.
Wm. Cramp & Sons, Philadelphia, Pa
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Webster, Camp & Lane Machine Co., Akron, O.
Fraser & Chalmers, Chicago, Ill.
Robins Conveying Belt Co., New York City.
Excelsior Iron Works Co., Cleveland, O.

MINE PUMPS—
F. M. Prescott Steam Pump Co, Milwaukee, Wis.

MOLDING MACHINES—
Tabor Mfg. Co., Elizabeth, N. J.

MOLDING SAND—
Ohio Sand Co., Conneaut, O.
F. B. Stevens, Detroit, Mich.
Garden City Sand Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.

MULTIPLE DRILLS—
Bickford Drill and Tool Co., Cincinnati, O.
Baush & Harris Machine Tool Co., Springfield, Mass.

NICKEL PLATING OUTFITS—
Northampton Emery Wheel Co., Chicago, Ill.

NUTS AND BOLTS—
Upson Nut Co., Cleveland, O.

OILLESS BEARINGS—
C. H. Besly & Co., Chicago, Ill.

OIL BURNERS—
W. S. Rockwell & Co., New York City.

OIL CUPS—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa

OIL FILTERS—
James Bonar & Co., Pittsburg, Pa.

OIL PUMPS—
C. H. Besly & Co., Chicago, Ill.

OIL SEPARATORS—
Harrison Safety Boiler Works, Philadelphia, Pa.
Austin Separator Co., Detroit, Mich.

ORE CARS—
The Pressed Steel Co, Pittsburg, Pa.

ORE CRUSHERS—
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers Chicago, Ill.

ORE SCREENS—
Seibel-Suesdorf Copper & Iron Mfg. Co., St. Louis, Mo.
Rob't Aitchison Per. Metal Co., Chicago, Ill.
The Aultman Co., Canton, O.
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Spearman Iron Co., Sharpsville, Pa.
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Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ill.
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago Ill,

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G. H. Ginther, Special Agent, Pittsburg, Pa.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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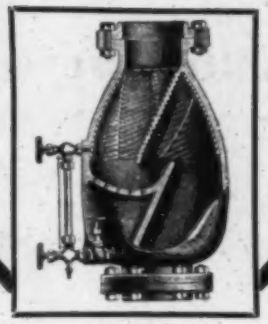

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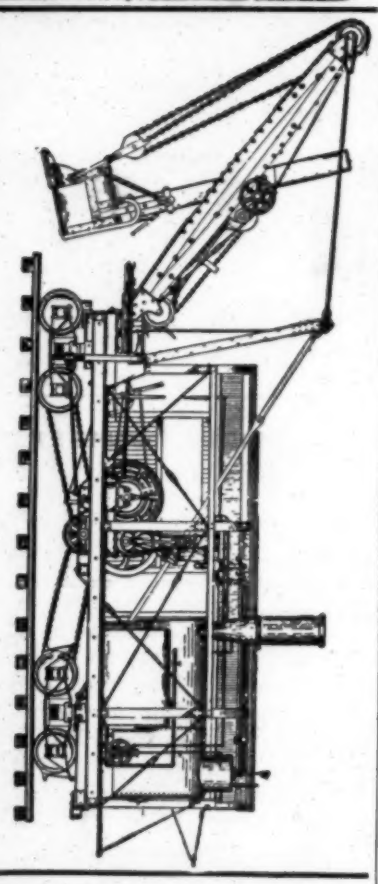

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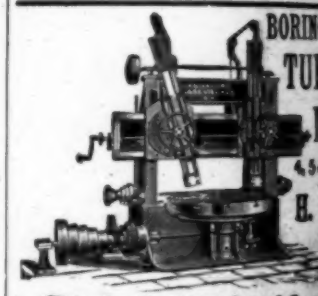

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